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1.0 INTRODUCTION

1.1 - Overview
For more than 50 years, the Miami-Dade County Public Works and Waste Management Department (PWWM) has served the Miami-Dade County (County) community. Today, PWWM is the largest government owned and operated waste collection and disposal system (System) in the southeastern United States. With a County population of approximately 2.6 million, PWWM has the significant responsibility of managing approximately 1.6 million tons of municipal solid waste (MSW) per year through its mission to provide customers with exceptional waste collection, recycling and disposal services that protect, preserve and improve the environment and the quality of life in the community. The System is fully integrated; designed to collect garbage and trash in the County’s service area, contract for the collection of recyclable material, provide waste transfer and disposal services Countywide, and contract with municipalities and private haulers for the provision of disposal services. The System includes a waste-to-energy facility, three landfills (a Subtitle D MSW landfill, a Class III landfill, and an Ash Monofill), three transfer stations, thirteen neighborhood trash and recycling centers, and two home chemical collection centers. The PWWM also regulates waste collection, transportation, and recycling Countywide. The PWWM ensures regulatory compliance through the Enforcement Division, which continues to be proactive in addressing and investigating occurrences of trash on the rights-of-way and illegal dumping.

In looking to the future, the County identified a number of short-term and long-term solid waste management challenges including limited remaining capacity at its landfills, expiring contractual agreements, aging facilities, and recent legislative mandates. As a result, the County decided to face these challenges head on and to develop a plan to manage the County’s solid waste for the next 50 years. The County retained HDR Engineering, Inc. (HDR) along with seven local subcontractors (HDR Team) to assist in developing a Solid Waste Master Plan (Master Plan) that would outline the PWWM’s goals, priorities and options for the next 50 years. The Master Plan project was divided into two phases. The goal of Phase I was to identify short and long-term System needs and to identify options and alternatives that meet those needs. During Phase II the PWWM and the HDR Team worked closely with the Solid Waste Advisory Committee (SWAC) to develop a policy framework, analyze options and alternatives, develop possible waste management scenarios, prepare a financial forecast and analyze the sustainable return on investment (SROI) for each scenario, and develop an implementation plan, which lead to the development of this Master Plan.

The Master Plan is designed to meet the projected needs of the County through the year 2060. While all of the proposed alternatives are intended to be implemented within the 50-year planning horizon, the long-term nature of the Master Plan dictates that it must be flexible enough to accommodate uncertainty and allow flexibility in timing and implementation. As well, many of the alternatives included in the Master Plan will involve activities that will need to be pursued on an ongoing basis throughout the planning period and beyond.

This Master Plan for the management of solid waste in the County describes the process through which the planning was performed and how it will be implemented. The Master Plan is presented in four sections:

Section 1: Introduction – General background on development of the Master Plan, an explanation of the purpose, and the approach taken in developing the Master Plan;

Section 2: The Existing System and Future Needs – Analyses of the existing conditions, pertinent regulatory and policy issues, long-term solid waste management needs, and potential waste management alternatives;

Section 3: Solid Waste Advisory Committee (SWAC) Process – Description of the SWAC and the detailed process implemented to develop the recommended Master Plan; and

Section 4: Implementation Plan – Presents the recommended plan and outlines the approach to implementing alternatives to meet the County’s short-term, mid-term, and long-term solid waste management needs.
1.2 - Purpose of the Plan
The purpose of this Master Plan is to develop a comprehensive roadmap for the future management of solid waste in the County by PWWM, and to clearly describe how existing and planned programs and facilities will work together to achieve the goal, objectives and policies adopted within this Master Plan.

Under Florida State Statutes, counties have the responsibility and power to provide for the operation of solid waste management facilities to meet the needs of all incorporated and unincorporated areas of the county. In order to fulfill this responsibility, the County has invested heavily in its existing solid waste management System to serve the needs of its residents and businesses. The County recognizes the need to develop a long-term plan that will guide that System for the next generation.

The County, located on south Florida’s east coast, is the state’s most populous county with an estimated 2012 population of approximately 2.6 million. PWWM currently provides waste collection and recycling services to more than 325,000 households in the unincorporated County and eight municipalities including: Aventura; Cutler Bay; Doral; Miami Gardens; Miami Lakes; Palmetto Bay; Pinecrest; and Sunny Isles Beach. They also provide disposal services that protect, preserve and enhance the environment and the quality of life in the community.

This 50-year Master Plan outlines the path forward that will allow PWWM to continue to manage the waste generated in the County responsibly from an economic, environmental, and social perspective for the benefit of its citizens.

1.3 - Approach to Developing the Master Plan
The planning process was initiated in 2009. The first steps in the planning process were to inventory, evaluate, and assess the existing solid waste management System, including: facilities; operations; contracts/agreements; financial position; and regulatory environment. This was followed by an evaluation of the quantities and flow of waste generated by residents, businesses and institutions, which included a two-season waste composition study to determine the composition of the County’s waste stream and identify the types and quantities of materials that could potentially be diverted from disposal. A tonnage projection analysis was also conducted in order to estimate the overall quantity of solid waste expected to be managed by the County and PWWM over the next 50 years. Finally, a study of municipalities similar to the County was conducted to identify best practices and as a basis for comparison.

Based on the findings from these initial efforts, the long-term solid waste management needs of the County were defined, and potential alternatives for addressing those needs were identified through a series of public meetings held in various areas of the County, together with guidance from PWWM senior staff and the HDR Team.

The next step in development of the Master Plan was formation of a SWAC representing a wide variety of stakeholders including: municipal waste collection and disposal customers, homeowner associations, environmental groups, local business and development interests, waste industry representatives and subject matter experts. This 15 member committee developed the policy framework and evaluation criteria by which it then evaluated and ranked each of the potential waste management alternatives. The rankings generated by the SWAC were then used to develop three possible Master Plan scenarios (as agreed upon by the SWAC). The three scenarios were individually analyzed to determine: 1) their ability to manage the waste projected to be generated over the 50-year planning period; 2) their financial viability; and 3) their overall impact on sustainability. The results of these detailed analyses were presented to the SWAC and a single Master Plan scenario was selected through a consensus vote of the members present (13 members present).

The final step in the planning process was to develop an implementation plan based on the selected scenario. Each of the steps involved in the planning process are outlined in greater detail in Sections 2 and 3 and the detailed implementation plan can be found in Section 4 of this document.

1.4 - Key Factors Affecting the System and Timeline
There were several key factors that had to be considered throughout the development of the Master Plan:

- Volume of Waste – The projected increase in the volume of waste expected to be generated within the County over the next 50 years will have a substantial impact on future solid waste management decisions. The waste projections in this report are based on two key parameters - population projections and per capita waste generation rate projections.

With a County population that is expected to grow from...
approximately 2.6 million to more than 4.3 million over the planning period, and a waste generation rate that is also expected to increase from 1.37 tons per capita to 1.44 tons per capita over the same period, the County must plan to properly manage an ever growing waste stream.

- **System Capacity** – The County is currently facing the challenge of declining disposal capacity. Two of the three County-owned landfills, North Dade Landfill (NDLF) and the Resources Recovery Landfill (RRLF), are projected to exhaust their existing permitted capacities in 2020 and 2021, respectively. The third County-owned landfill, South Dade Landfill (SDLF), is projected to reach its permitted capacity by 2029. In addition, the County-owned Resources Recovery Facility (RRF) is projected to reach its peak operating capacity in 2021. These factors combined with the projected increases in waste generation in the coming years, present clear disposal capacity challenges that must be addressed through the alternatives adopted in the Master Plan.

- **Existing Contractual Commitments** – The County has a number of existing contractual commitments related to the collection and disposal of solid waste. These include:
  - Thirteen of eighteen existing inter-local disposal agreements with municipalities representing 43 percent of current System tonnage are set to expire in 2015 if they are not re-negotiated or new agreements are not signed;
  - Major hauler disposal agreements with private companies Progressive Waste Solutions of Florida, Inc. (Progressive) and Waste Management, Inc. of Florida (WMIF) are set to expire in 2015; and
  - Current term of the agreement with Covanta Energy to operate the County’s RRF is set to expire in 2023.

The specific terms and timeframes of these existing agreements were key factors that had to be considered in developing the Master Plan and in determining the potential viability and timing of certain alternatives in the Master Plan.

- **Legislative Mandates** – In 2008, through the passage of House Bill (HB) 7135, the Florida Legislature set a new goal of recycling 75 percent of the waste stream by 2020. In 2010, HB 7243 also established interim goals, requiring counties to attain recycling rates of 40 percent by 2012, 50 percent by 2014; 60 percent by 2016; and 70 percent by 2018. According to the Florida Department of Environmental Protection (FDEP), the County had a recycling rate of 46 percent in 2012, thereby meeting the 2012 interim goal. However, the County will need to be proactive in planning and implementing alternatives (programs and policies) that will allow it to meet subsequent interim goals, as well as the ultimate 75 percent recycling goal. Such alternatives could include a combination of: traditional recycling; use of waste as fuel or fuel substitutes; beneficial reuse of yard trash; and/or production of renewable energy from waste.

### 2.0 PHASE I – THE EXISTING SYSTEM AND FUTURE NEEDS

#### 2.1 - Introduction

Phase I was performed to evaluate the existing System and future needs. The initial activities during Phase I consisted of an evaluation of the existing conditions of the System. The goal of this activity was to gain an understanding of the components that comprise the integrated System and assess the current capacity. The HDR Team evaluated each of the major System components including (i) the Resources Recovery Facility (RRF); (ii) landfills; (iii) transfer operations; and (iv) collections program. The HDR Team also completed a Waste Composition Study (WCS) of the current waste stream, an evaluation of the current PWWM financial program, a comparison of other communities solid waste master plans, and a review of regulatory and policy issues. Later activities associated with Phase I focused on evaluation of future System needs. Descriptions of these evaluations and summaries of the findings are provided below.

#### 2.2 - Evaluation of Existing Conditions

##### 2.2.1 - RESOURCES RECOVERY FACILITY

The County’s RRF serves as a major component in the integrated System handling more than 50 percent of the waste managed by the PWWM. This facility provides for the conversion of solid waste to energy through a combustion process. The power generated at this 72 megawatt facility provides enough energy to operate the plant and supply the electrical needs of approximately 45,000 homes.
The RRF was opened in 1982 and is owned by the County, but is operated by Covanta Dade Renewable Energy LTD (Covanta) through a contractual agreement with the County which expires in 2023, plus four 5-year mutual options to renew. This agreement contains a put-or-pay clause which states that the County must deliver at least 972,000 tons of waste to the facility or pay a fee for the amount not delivered. As discussed in subsequent sections of this document, this clause is a principle driver in determining how waste is transferred in the System, and therefore is a major factor in the overall operations of the PWWM.

The County’s RRF serves as a major component of PWWM integrated systems. Two distinct MSW fractions (garbage and trash) are received and processed in two separate processing areas at the RRF. Garbage is discharged from incoming waste vehicles on the garbage tipping floor and pushed into the garbage pit. During garbage processing, metals are removed for recycling and the remaining garbage is shredded to produce refuse derived fuel (RDF). Garbage processing also produces a grit-like process residue referred to as “unders.” This material is typically disposed of at the SDLF, where it can be used as a daily cover for unprocessed waste.

Trash is discharged from incoming waste vehicles on the trash tipping floor, where it is sorted prior to processing and pushed into the trash pit. During trash processing, metals are removed for recycling and the remaining trash is shredded to produce biomass fuel, a portion of which is used to supplement the RDF used to generate electricity at RRF. The bulk of the biomass fuel is sold to cogeneration facilities in Central Florida. Trash processing also produces process residues in the form of “fines” and “recyclable trash rejects.” Fines can be used as daily cover for unprocessed waste at both the NDLF and SDLF. Recyclable Trash Rejects are landfilled.

The RDF and biomass fuel generated by garbage and trash processing are combusted in a furnace to generate approximately 72 megawatts of electricity for on-site consumption and export. The ash product that results from the combustion process is approximately 10 percent by volume of the original waste material and is placed in the RRLF adjacent to the facility. The RRF also has a sophisticated air quality control system to remove acid gases and particulate matter from the flue gas prior to emission to the atmosphere.

The HDR Team evaluated the RRF in October 2009, and the findings from this assessment are provided in detail in Technical Memorandum 2.1 – Resources Recovery Facility Review, which is presented in Appendix A.

2.2.2 - LANDFILLS
The HDR Team evaluated the three County-owned landfill facilities in October 2009. The HDR Team also reviewed alternative private landfills that could be considered for long term disposal options. The summary of the findings from these evaluations is provided below.

Miami-Dade County Landfills
The County owns and operates three landfills, the NDLF, the SDLF and the RRLF. The NDLF and the SDLF account for the disposal of almost 40 percent of the garbage and trash managed by the PWWM. As previously mentioned, the RRLF provides for the disposal of the ash generated from the RRF operations.

The NDLF is a 269-acre site located in the north end of the County and is permitted to receive Class III waste, which is defined by the FDEP as “yard trash, construction and demolition (C&D) debris, processed tires, carpet, cardboard, paper, glass, plastic, furniture and other appliances, or other materials approved by the Department that are not expected to produce leachate that poses a threat to public health or environment.” Based on data reported to PWWM in 2009, the NDLF was estimated to have a remaining capacity of 1.96 million tons, which equates to approximately 11 years of life considering a disposal rate of 186,600 tons per year and a reported compaction ratio of 0.5 tons per cubic yard.

The SDLF is a 300-acre site located in the south end of the County and is the only Class I waste disposal facility in the System. The SDLF is permitted to receive MSW, C&D debris, contaminated soil, pathological waste, sterile medical waste, asbestos, off road tires, and dewatered wastewater sludge. Based on data reported to the PWWM in 2009, the SDLF was estimated to have a remaining capacity of 6.67 million tons which equates to more than 20 years of life considering a disposal rate of 360,250 tons per year and a reported compaction ratio of 0.55 tons per cubic yard.
The RRLF, located adjacent to the RRF in the northwest part of the County, is a 160-acre combined site. The waste received at the RRLF is the resulting ash from the combustion process at the RRF. Based on data reported to the PWWM in 2009, the RRLF was estimated to have a remaining capacity of 1.98 million tons which equates to approximately 12 years of life considering a disposal rate of 161,000 tons per year and a reported compaction ratio of 1.25 tons per cubic yard.

The HDR Team evaluated the Miami-Dade County Landfills in October 2009, and the findings from this assessment are provided in detail in Technical Memorandum 2.2 – Landfill Facilities Operation Review, which is presented in Appendix B.

Alternative Private Landfills
The HDR Team reviewed seven alternative private landfills located in Florida and Southern Georgia that may be considered as future disposal options for the County. Two of the landfills, the Medley Landfill located in Medley, FL and the Monarch Hill Landfill (formerly known as the Central Landfill) located in Pompano Beach, FL, both owned by WMIF, are already included as part of the current System through a contract between WMIF and the County, which expires in 2015. The County’s contract with WMIF has a 100,000 tons put-or-pay clause for the Medley Landfill. The Monarch Hill Landfill is only used as a contingency.

The other five private landfills reviewed by the HDR Team included: (i) Okeechobee Landfill in Okeechobee, FL owned by WMIF; (ii) JED Solid Waste Management Facility in St. Cloud, Florida owned by EISI (formerly known as WSI); (iii) Chesser Island Road Landfill in Folkston, Georgia owned by WMIF; (iv) Pecan Row Landfill in Valdosta, Georgia owned by Veolia Environmental Services, Inc.; and (v) Springhill Regional Landfill in Cambellton, Florida owned by WMIF. These alternative private landfills were found to have up to 30 years of remaining life, possibly up to 60 years with pending plans for expansions. The results of this assessment are included in Technical Memorandum 2.3 – Alternative Landfills, which is presented in Appendix C.

2.2.3 - TRANSFER OPERATIONS
The PWWM transfer operation is a vital component of the integrated System. The ultimate role of the transfer operations is to provide locations where waste can be transferred from smaller collection vehicles to larger tractor trailers for an efficient and economical means of moving waste. However, the transfer operations also serve a purpose to distribute a defined amount of waste or a particular type of waste to a specific disposal facility. This enables the PWWM to meet the put-or-pay obligations at both the RRF and the Medley Landfill and to deliver segregated materials for disposal at the appropriate facility (i.e. trash at the NDLF).

Transfer operations primarily occur at the three transfer stations, the Northeast Transfer Station (NETS), the Central Transfer Station (CTS), and the West Transfer Station (WTS). Combined, the three transfer stations receive and transfer approximately 35 percent of the total waste managed in the System on an annual basis. In addition, the PWWM conducts transfer activities at the NDLF, SDLF and RRF. The HDR Team evaluated the transfer operations and the findings are detailed in Technical Memorandum 2.4 – Transfer Stations Operations Review, which is presented in Appendix D.

Northeast Transfer Station
The NETS is an 11-acre site that is owned and operated by the County with a current capacity to receive 1,200 tons of waste per day (operating six days a week). This facility receives waste from County collection vehicles, municipal collections, and private haulers. Trash and garbage are delivered to separate buildings at the facility, a compactor building for garbage and a surge pit building
for trash. Garbage is loaded into transfer trailers through compactor units and trash is loaded using a bulldozer and crane. From the NETS, trash is delivered to the NDLF, RRF, or Medley Landfill. Garbage is delivered primarily to the RRF. In fiscal year (FY) 2008, the PWWM reported that the NETS received over 221,000 tons of waste which indicates that this facility operated at 59 percent of its design capacity.

Central Transfer Station
The CTS is a 2.68 acre site owned and operated by the County with a current capacity to receive 1,200 tons of waste per day (operating six days a week). This facility receives waste from County collection vehicles, municipal collections, and private haulers. Trash and garbage are delivered to separate areas of the only building on site. Both garbage and trash are loaded into transfer trailers using compactor units. From the CTS, trash is delivered to the NDLF, RRF, or Medley Landfill. Garbage is delivered primarily to the RRF. In FY 2008, the PWWM reported that the CTS received over 164,000 tons of waste which indicates that this facility operated at 44 percent of its design capacity.

West Transfer Station
The WTS site is owned by the City of Coral Gables, but is operated by the County through a 30-year lease agreement which expires in 2026. This facility has the current capacity to receive 1,200 tons of waste per day (operating six days a week) from County collection vehicles, municipal collections, and private haulers. Trash and garbage are delivered to separate areas inside the only building on site. Trash is delivered to a surge pit and loaded into transfer trailers using a bulldozer and a crane. Garbage is delivered to an open area on the tipping floor and then loaded into the transfer trailers using cranes. From the WTS, trash is delivered to the NDLF, RRF, and Medley Landfill. Garbage is delivered primarily to the RRF. In FY 2008, the PWWM reported that the WTS received over 405,000 tons of waste which indicates that this facility operated at 65 percent of its design capacity.

Other Transfer Operations
In recent years, PWWM has also used the SDLF facility as a location to transfer waste primarily for two reasons: (i) to save capacity at the SDLF by diverting waste material; and (ii) to meet the put-or-pay-obligation at the RRF. As previously mentioned, the SDLF is the only permitted Class I facility in the System and receives a large portion of incoming waste from various sources in the County. In FY 2008, the PWWM reported that over 232,000 tons of waste was transferred from the SDLF to the RRF. This amount of waste indicates that the transfer operation at the SDLF is currently the second largest in the System, second only to the WTS.

The PWWM also conducts transfer operations at the RRF and NDLF. The transfer operation at the RRF involves removal of unders, fines, recyclable trash rejects, non-processable wastes and shredded and oversize tires. At the NDLF processable trash is segregated from non-processable trash for transfer to the RRF.

2.2.4 - COLLECTION OPERATIONS
The role of the collection program in the System is to provide customers in the unincorporated areas of the County and eight municipalities with collection service for garbage, trash, and recyclables from either the curbside or at convenient drop-off locations in the County. The PWWM collections program includes the curbside garbage and trash collections by PWWM vehicles, the 13 neighborhood Trash and Recycling Centers (TRCs), the two Home Chemical Collection Centers (HC2s), and the single-stream recycling service provided by private companies. The HDR Team evaluated the PWWM collections program and the findings were presented in Technical Memorandum 2.5, which is presented in Appendix E.

PWMM Collections
The PWWM provides collection services for residential garbage and trash generated by approximately 325,000 households in the unincorporated portions of the County, as well as the municipalities of Aventura, Cutler Bay, Doral, Miami Gardens, Miami Lakes, Palmetto Bay, Pinecrest and Sunny Isles Beach who participate in accordance with County Ordinance 96-30, which requires areas that incorporate after 1996 to remain part of the System. The PWWM collects waste from approximately 2,300 commercial establishments, but does not actively compete for these accounts. The PWWM collects waste from some multi-family residential establishments that are considered “Residential Units,” in accordance with Section 15-1 of the Miami-Dade County Code of Ordinances (Code). The PWWM collected more than 800,000 tons of waste in FY 2008 from these various sources. Recently, the PWWM had converted from manual to automated method of collection of residential garbage as a more efficient means of service.

The HDR Team evaluated the PWWM collections program through a series of interviews with key PWWM staff, field observations, inspections at work sites, and a review of the County ordinances relating to the program. HDR found PWWM’s waste collection operations to be adequate. These operations can be adjusted as needed through PWWM investments. Demand for PWWM collections is driven by household growth in the unincorporated areas of the County as well as participating municipalities.
Trash and Recycling Centers
The PWWM owns and operates 13 TRCs that provide a location for residents in the unincorporated portion of the County as well as those in the eight service area municipalities to drop-off bulky waste, yard waste, C&D debris, and at select locations, electronics, used motor oil and tires. In FY 2008, the TRCs combined received over 175,000 tons of waste, which accounted for approximately 9.6 percent of the total waste in the System. The TRCs are designed to have the customers enter the facility and unload their vehicles by placing waste in specific bins. PWWM staff is on site to direct the customers to the appropriate bins and to assist as necessary.

Customers at the TRCs place their waste in specific bins.

As part of the evaluation of these facilities, the HDR Team monitored the operations to determine an average capacity of the facilities. Based on this evaluation, the TRCs were found to be only operating at an approximate 22 percent utilization rate. The TRCs were also found to be in need of general repair and maintenance including new pavement markings and signage that would assist in directing customers that are entering the facilities. It should also be noted that the Miami-Dade County Comprehensive Development Master Plan states that a TRC should be located within a five-mile distance of residential areas within the defined Urban Development Boundary (UDB) in the County. Therefore, although the TRCs were found to have a low utilization rate indicating that there is more than enough current capacity, additional facilities may be required in the future if the UDB is expanded.

Home Chemical Collection Centers
The PWWM operates two HC2s that provide non-commercial residents a location to drop off paints, pesticides, solvents, pool chemicals, fluorescent light bulbs, batteries, fuels, oils, electronics, and other household items that contain household chemicals.

The HC2s operate in a similar manner as the TRCs in which customers enter the facility, and are directed by PWWM onsite staff to place the waste material in specific locations. In FY 2008, the HC2s received approximately 450,000 pounds of waste material, a small fraction of the total waste handled by the PWWM. However, as part of the evaluation of these facilities, the HDR Team noted that the amount of waste received at these two facilities has been steadily increasing over the last several years. But, similar to the TRCs, the HC2s were found to be currently operating below capacity.

Recycling
The PWWM, through a contract with multiple companies, provides recycling collection service to residential units in its service area and 12 participating municipalities for paper products, cardboard, aluminum and steel containers, and plastic containers with a narrow neck. Between October 2008 and September 2009, the PWWM reported that nearly 60,000 tons of recyclables were collected. The PWWM had recently converted to automated, single stream collection to provide customers with an easier, more efficient means to contribute to recycling. The collection service is provided through a contract with World Waste Inc. and WSI, and the processing of these materials is provided through a contract with WMIF. Since all the recycling services are provided through contractual agreements, the current capacity was found to be adequate. The only deficiency that was noted by the HDR Team in this program was the lack of capability to realistically enforce mandatory recycling requirements at over 100,000 multi-family and commercial establishments countywide. That said, the PWWM’s current approach, which focuses on informing business owners and property managers about the requirements for and potential benefits of recycling during field visits by enforcement officers appears reasonable.

New carts for automated, single stream recycling.
2.2.5 WASTE COMPOSITION STUDY
The HDR Team conducted a WCS to estimate the composition of garbage delivered to the System. The statistical characteristics of the County’s garbage stream serves as an important indicator of the current trends of waste generated in the County and can serve as a useful tool in determining the framework of the future System components. The HDR Team used a two-season approach for the WCS to determine the effects of seasonal impacts. Garbage streams were selected from multiple generator types including single family homes, multi-family complexes, and commercial units. The WCS was conducted at three PWWM locations, the RRF, the SDLF, and the WTS. The HDR Team developed a list of material categories to classify the samples from the incoming material during the sorting process, and a weighted average of each material category was calculated for each sample. A detailed report of the process and outcome of the WCS is presented in Technical Memorandum 2.6 – Waste Composition Study, which is included in Appendix F.

The results of the WCS indicated that half of the County’s garbage consists of potentially recyclable materials, including: paper (19 percent); containers (10 percent); and organics (21 percent). C&D debris was found to make up approximately 8 percent of the waste stream. Little seasonal variation was found between the summer and winter sorting events with the only significant differences being a lower percentage of yard waste during the winter, but a higher percentage of food waste.

The WCS concluded that opportunities exist for the County to implement additional materials recovery. Several approaches were identified that the County could consider, including expanded public education, technical assistance with multi-family complexes and commercial establishments, increased enforcement of the mandatory recycling requirement, and composting yard and food waste.

2.3 - Financial Program
The HDR Team conducted an evaluation of the PWWM current financial program in three parts. First, a financial model was developed to create a baseline understanding of the financial conditions, requirements and performance. A detailed description of the model with its results was presented in Technical Memorandum 2.7 – Evaluation of Current Financial Program, which is presented in Appendix G. Secondly, the financial performance of the PWWM operations were compared to other municipal jurisdictions in Florida and elsewhere in the United States that had comparable solid waste management components and conditions as Miami-Dade County. The purpose of this comparison was to develop a benchmarking analysis on the basis of collections operations, disposal operations, and transfer operations. A detailed description of the financial benchmarking analysis is presented in Appendix H, Technical Memorandum 2.8 – Comparative Analysis of Miami-Dade Department of Solid Waste Management System Performance. Finally, potential short and long improvements to the PWWM financial program were identified and presented Appendix I, Technical Memorandum 2.9 – Management Financial Program - Limitations and Opportunities for Improvement.

A financial model was developed that, considering the historical fiscal performance of PWWM and using a set of reasonable base case assumptions, projected operating cash flow through FY 2019-2020. The results of the financial model indicated that the PWWM will fail to meet the required senior debt service coverage ratio (Net Operating Revenue must meet 120% of the principal and interest requirements for the outstanding bonds) in Fiscal Year 2013-2014 without a significant increase to revenues assuming that any cost reductions alone will not be sufficient. The model also indicated that the PWWM unrestricted cash balance of $96.6 million in FY 2010-2011 will steadily decline and reach a zero balance by FY 2017-2018.

COMMITMENT TO SUSTAINABILITY

Miami-Dade County’s commitment to sustainability requires a Master Plan that is environmentally sound and socially and economically viable. Meeting the current solid waste needs of our community, while conserving resources for the future, requires a balanced effort. The Master Plan process will look at new technology, resource conservation, recycling, waste diversion and responsible financing to find solutions for our sustainability needs.

The financial benchmarking analysis compared the PWWM financial performance to the solid waste management operations of the City of Los Angeles, California, the City of Phoenix, Arizona, Hillsborough County, Florida, Pinellas County, Florida, Orange County, Florida, and Palm Beach County, Florida. Although operating conditions can vary greatly from one community to another, making direct comparisons difficult, the results of the benchmarking indicated that the PWWM disposal system is cost effective when compared to these communities, but PWWM waste transfer and collections costs were found to be relatively higher. The higher transfer costs were most likely attributed to the various types of transfer trailers used by PWWM, the age of the transfer stations (i.e. higher maintenance costs) and low utilization rates of the transfer stations. The higher collections costs were most likely attributed to the lack of a setout limit for garbage and trash, various methods implemented for collecting...
trash (including TRCs), high vehicle maintenance costs, and a geographically large service area.

Upon review of the PWWM’s financial programs, the HDR Team noted that PWWM has established a comprehensive and effective set of financial policies. The HDR Team also noted that PWWM’s financial program may be improved by utilizing software, currently available to the County that can facilitate performance measurement and provide an expanded ability to monitor and analyze information needed to manage performance. The HDR Team also identified additional performance management software, that other County departments are currently evaluating, that has the capability of going beyond the generation of performance measures, including displaying trends, providing more detail where wanted, relating data for different operations to one another, and examining the impact of varying different cost or performance factors. The HDR Team noted that implementation of these software programs would significantly benefit the PWWM by enabling managers to better understand the sources of its expenses and level of performance, and to formulate improved, more cost-effective processes.

2.4 - Comparative Analysis
Using the same communities that were used for the financial benchmarking mentioned above (City of Los Angeles, California, the City of Phoenix, Arizona, Hillsborough County, Florida, Pinellas County, Florida, Orange County, Florida, and Palm Beach County, Florida), the HDR Team also reviewed those communities’ solid waste master plans to identify programs and policies that may be beneficial to the System. The details of the documents review are presented Appendix J, Technical Memorandum 2.10 – Identify and Evaluate Existing and Future Similar Solid Waste Management Plans.

Upon review of the solid waste master plans, the HDR Team found that the mechanism in which communities meet their solid waste planning needs varies from one community to the next. Although some communities have what can be considered as traditional solid waste master plans (i.e. Orange County, Florida), others have a detailed solid waste element included in their Comprehensive Plan or General Plan (i.e. Hillsborough County, Florida, Pinellas County, Florida and Phoenix, Arizona), while still others have opted for a more specific, subset plan such as a zero waste plan (i.e. City of Los Angeles, California) or integrated solid waste resource plan (i.e. Palm Beach County, Florida). However, regardless of the type of document generated, each community used the same basic approach to generate a plan including (i) inventory existing conditions to identify needs and deficiencies; (ii) identify future needs and alternatives; (iii) develop goals, objectives, and policies; and (iv) develop an implementation plan.

There also seemed to be critical elements of solid waste planning that were consistent with each document and included source reduction, development of community based groups for public education and input, and the conservation of disposal through source reduction, recycling and resource recovery. In addition, each of the plans seemed to recognize the importance of ongoing assessments of capacity and waste stream monitoring throughout implementation of the plans.

2.5 - Regulatory and Policy Issues
The regulatory and policy climate is a major factor in long term-solid waste planning. Therefore, the HDR Team identified and summarized key regulatory requirements and policy issues at the federal, state, and local levels related to the various environmental regulatory and administrative approvals and processes required for the implementation and operation of current and potential future solid waste management facilities and programs in the County. A complete summary of the regulatory and policy review is presented in Appendix K, Technical Memorandum 2.11 – Regulatory and Policy Review.

The HDR Team identified relevant, recent and potential regulatory and policy changes at the federal, state and local levels, and cited the potential impacts they would have on the individual System components. The HDR Team found that the biggest impact on the System could come from a state recycling goal of 75% which would be required by 2020. This recycling goal could impact the overall manner in which the PWWM operates the System including the RRF which could be an important factor in calculating the recycling credits for the State rule. Another important potential regulation stems from Supreme Court ruling in 2007 which upheld a flow control ordinance in New York. Although the PWWM does not currently implement a flow control policy, this ruling enables for the possibility of a flow control ordinance in Miami-Dade County as a means to legally ensure that waste generated in the County is disposed at a County-owned facility. Other important regulations that were noted by the HDR Team included (i) a potential emission standard by the United States Environmental Protection Agency (EPA) on medium and heavy duty vehicles which would affect many of the PWWM’s facility equipment and operations, including collection and transfer vehicles, and front end loaders at the transfer stations and landfill facilities; (ii) an EPA greenhouse gas reporting rule which will require additional reporting of greenhouse gas emissions from the RRF and the landfills; and (iii) a change to the Florida Administrative Code which now requires Class III landfills to have a bottom liner which could impact the costs for potential expansion of the NDLF.
2.6 - Long-Term Solid Waste Management Needs

A major component of Phase I was defining the long-term solid waste management needs of the System. These needs are contingent on the amount of solid waste that will be generated in the County over the next 50 years. Therefore, the HDR Team completed a waste generation projection for the County through 2060. The results of the waste generation projection were then compared to the current capacity of the System to determine the current and future needs. The following sections describe the methodology used by the HDR Team for waste generation projections by a description of the solid waste management needs.

2.6.1 - WASTE GENERATION PROJECTION

The amount of solid waste in the County over the next 50 years will be used to determine what the PWWM will need to adequately manage the quantity of waste. In order to define the needs of the System, the HDR Team first had to perform a projection of the amount of solid waste that would be generated in the County through 2060. The solid waste generation projections were based on two key future estimates, population and waste generation rate (tons/capita/year). The HDR Team completed an estimated projection of both these factors as part of this task, and the detailed projections are included in Appendix L, Technical Memorandum 3.1 – Solid Waste Generation Projections.

To estimate the future population of Miami-Dade County, the HDR Team relied on the report titled “Projections of Florida Population by County, 2008-2035”, dated March 2009 and prepared by the University of Florida’s Bureau of Economic Research (UF BEBR). Since this report only projected population for another 25 years and the planning period is for 50 years, the HDR Team used a linear projection of the UF BEBR data to estimate population through 2060. Based on this methodology, the current population in the County of over 2.5 million was projected to increase to over 3 million by 2025 and over 4 million by 2055.

<table>
<thead>
<tr>
<th>Year</th>
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<tbody>
<tr>
<td>2010</td>
<td>2,555,200</td>
</tr>
<tr>
<td>2015</td>
<td>2,719,300</td>
</tr>
<tr>
<td>2020</td>
<td>2,896,000</td>
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<tr>
<td>2025</td>
<td>3,075,600</td>
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<td>2030</td>
<td>3,256,200</td>
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<td>2045</td>
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<td>2050</td>
<td>3,969,940</td>
</tr>
<tr>
<td>2055</td>
<td>4,147,220</td>
</tr>
<tr>
<td>2060</td>
<td>4,324,500</td>
</tr>
</tbody>
</table>

Table 3.1: Miami-Dade County Population Projections (2010 to 2060)

To obtain a future estimate on the waste generation rate, the HDR Team used a three-step process. Step 1 was to calculate the historical (1998-2008) waste generation rates in the County using historical solid waste data and population data sourced from the PWWM, FDEP, and the Miami-Dade County Department of Planning and Zoning. Step 2 was to determine the waste generation trends. Finally, Step 3 was to apply the waste generation rate trends into the future to the year 2060. Using this three step process, the HDR Team estimated that the current waste generation rate of 1.37 tons/capita/year would increase at an annual rate of 0.1% to 1.44 tons/capita/year by 2060.

Having completed the population and waste generation rate projection, the HDR Team estimated that the volume of solid waste generated in the County would increase from its current estimate of over 3.5 million tons to more than 5 million tons by 2040, and over 6 million tons by 2060. To estimate the amount of solid waste that would be managed by the PWWM, the HDR Team used historical data reported by the PWWM and the FDEP that indicated that on average, the PWWM manages 47 percent of the waste generated in the County. The HDR Team estimated that the volume of waste received by the PWWM would increase from the current amount of 1.6 million tons to over 2 million tons by 2025 and almost 3 million tons by 2060.

2.6.2 - SOLID WASTE MANAGEMENT NEEDS PROJECTION

Having evaluated the System components and the current capacity, and having completed the waste generation projections, the HDR Team identified the current and future needs of the System. The needs
Each County-owned landfill was found to have limited remaining capacity and were projected to run out of capacity during the 50 year planning period. The HDR Team projected that the NDLF, SDLF and RRLF would run out of capacity by 2020, 2021, and 2029 respectively. During the evaluation of the existing conditions at the landfills, the HDR Team noted operational opportunities that may be captured to increase the life of the landfills or increase efficiency including recovering recyclable material, evaluating the transfer operations that occur at these facilities, and consider landfill mining.

**Transfer Operations**
The PWWM transfer operations serve as a vital component of the integrated solid waste System. In FY 2008, the transfer stations combined to receive over 35 percent of the total waste managed by the PWWM (NETS – 12 percent, CTS – 9 percent, WTS – 14.5 percent). However, each transfer station was found to be operating well below capacity, which may result in higher operating costs. As a result, the existing capacity at the CTS was projected to be adequate for the planning period. The HDR Team projected that additional capacity or a rebalancing of the System would not be needed until later in the planning period to address capacity needs at the NETS (projected to be at capacity by 2051) and the WTS (projected to be at capacity by 2040). During the assessment of these facilities, the HDR Team noted how the PWWM staff has been able to demonstrate a high degree of flexibility in operating these facilities to meet the put-or-pay demands at the RRF or Medley Landfill that can vary widely on a weekly basis. However, the HDR Team also noted operational opportunities to increase efficiency including increased tipping floor maintenance, reconfiguring for top loading, and increased maintenance of the administration areas.

**Collections Program**
The PWWM collections program consists of the PWWM garbage collections and transportation, recycling collections through contracts with private companies, the TRCs, and the HC2s. The HDR Team found the collection services currently provided by the PWWM to be adequate for the existing services, and additional equipment and personnel could be added as necessary as additional waste tonnage enters the system. Therefore no specific needs were identified for this component. The HDR Team noted an opportunity to reduce costs by reducing the frequency of garbage collection to once a week, now that the PWWM had converted to an automated process.

Since the recycling program is contracted to private companies and the level of service provided was adequate, no needs were identified. The only opportunity identified by the HDR Team related to better enforcement of recycling requirement by multi-family and commercial
properties as required in the Code, or to implement additional recycling programs based on the information gained from the WCS.

During the existing conditions assessment, the HDR Team found the TRCs and HC2s operate well below their design capacity; therefore the existing capacity at these facilities was projected to be adequate for the planning period. Operationally, the HDR Team noted that general maintenance improvements (signage, roadway markings, etc.) could be completed which would allow customers to easily move through the facilities thereby increasing the efficiency.

2.7 - Alternatives to Address Needs

2.7.1 - PUBLIC AWARENESS AND INPUT

From the outset of the planning process, the PWWM has recognized the importance and value of public awareness and input. During Phase I, the focus of the public awareness and input task was to increase awareness of the Master Plan and its process, as well as to educate the public on the operations of the PWWM and how it is vital to the community’s needs. The public awareness and input task was also used as an opportunity to obtain ideas, opinions, and alternatives from citizens on how the PWWM operations and programs could be improved. The HDR Team worked together with the PWWM to develop a presentation on the System, the need for the Solid Waste Master Plan, the tasks completed as part of Phase I, and an overview of the scope of work for Phase II. At the end of each presentation, the audience was provided an opportunity to ask questions, provide comments, and more importantly, express any ideas that they might have on how the System, programs or operations could be improved. The ideas expressed during the public presentations were recorded and compiled by PWWM staff.

The HDR Team and the PWWM conducted the public awareness and input presentation to the following stakeholder groups:

- Publicly advertised meetings (north, central, and south parts of the County)
- County Departments’ representatives
- Environmental Groups
- Waste Haulers
- Sierra Club
- Greater Miami Chamber of Commerce
- Other miscellaneous events

Although the presentation was slightly different given the audience, a copy of the typical presentation is presented in Appendix N.

2.7.2 - IDENTIFICATION OF POTENTIAL SOLID WASTE ALTERNATIVES

The culminating task of Phase I was to identify potential solid waste alternatives. The purpose of this task was to identify any and all alternatives that may be available to address the solid waste management needs identified during the earlier tasks of Phase I. The idea was to simply identify potential alternatives, and not attempt to evaluate the alternative’s cost, feasibility, implementation, etc. This allowed for a free flow of ideas with no limitations or boundaries on the ideas and alternatives identified.

To accomplish this task, the HDR Team worked with the key PWWM staff through a series of interviews and workshops. At these forums, the HDR Team first presented the findings of the existing conditions assessment and the solid waste management needs projection. Based on these findings, the HDR Team and PWWM staff took a component-by-component look at the needs, deficiencies, and opportunities to generate a comprehensive list of alternatives for the long-term operations of the solid waste System in the County. Some of the alternatives identified were directed toward a specific need, while others were more general in scope, encompassing more of the entire System. Numerous potential alternatives were identified that related to facilities (or technologies), programs, and policies for each System component. In addition, alternatives related to other System impacts (i.e. revenue generating alternatives), were also identified during the discussions and workshops.

Once all the alternatives were identified, a complete list was compiled by the HDR Team. The list included the ideas and alternatives that were received during the public outreach and input component of Phase I. The HDR Team then separated the final list of alternatives by category based on each System component so that they could be evaluated, compared, screened, etc. during Phase II of the Project. A copy of the complete list of alternatives is provided as Appendix O.

3.0 PHASE II – SOLID WASTE ADVISORY COMMITTEE (SWAC) PROCESS

3.1 - Introduction

Phase II of developing the Master Plan consisted of establishing a SWAC and guiding the SWAC through an eight month facilitated process to reach consensus regarding the recommended direction and priorities for the new 50-year Master Plan. The following sections describe the purpose and makeup of the SWAC and provide a detailed discussion of the process that the SWAC followed in developing their recommendations.
3.2 - Solid Waste Advisory Committee

3.2.1 - OVERVIEW
The purpose of forming a Solid Waste Advisory Committee was to obtain broad-based and informed public input into the planning process in order to establish a Master Plan that is representative of the interests of community stakeholders. A principal role of the SWAC in the planning process was to work interactively with the planning team (consisting of PWWM project managers and the HDR Team) to develop a policy framework upon which decisions regarding the evaluation and ranking of alternatives and ultimately the Master Plan would be based.

Table 3.2: Solid Waste Advisory Committee Members

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>Organization</th>
<th>Stakeholder Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annette Anderson</td>
<td>Secretary</td>
<td>North County Citizens Association</td>
<td>Homeowners</td>
</tr>
<tr>
<td>Linda Benson</td>
<td>Miami Group Chair</td>
<td>Sierra Club</td>
<td>Environmental Group</td>
</tr>
<tr>
<td>Melvin Bratton</td>
<td>Participant</td>
<td>Citizens Advisory</td>
<td>Homeowners</td>
</tr>
<tr>
<td>Keith Carswell</td>
<td>Director of Solid Solid Waste Management</td>
<td>City of Miami</td>
<td>Municipal Disposal</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Customers</td>
</tr>
<tr>
<td>Dr. Robert Cruz</td>
<td>Chief Economist</td>
<td>Miami-Dade County</td>
<td>Subject Matter Expert</td>
</tr>
<tr>
<td>Alex Gonzalez</td>
<td>Government Affairs Director</td>
<td>Waste Management Inc. of Florida</td>
<td>Solid Waste Industry – Landfill Owner-Owner</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Provides Disposal Capacity to PWWM</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Major Disposal Customer</td>
</tr>
<tr>
<td>Jose Gonzalez</td>
<td>Vice President, Florida East Coast Industries, Flagler Development Group</td>
<td>Builders Association of South Florida</td>
<td>Local Business and Development Interests</td>
</tr>
<tr>
<td>James Kohnstamm</td>
<td>Vice President</td>
<td>The Beacon Council</td>
<td>Local Business and Development Interests</td>
</tr>
<tr>
<td>Morgan Levy</td>
<td>Officer</td>
<td>West Dade Federation of Homeowners Associations</td>
<td>Homeowners</td>
</tr>
<tr>
<td>Bill Meredith</td>
<td>Business Manager</td>
<td>Covanta Dade Renewable Energy Ltd.</td>
<td>Solid Waste Industry - Resources Recovery Facility Operator</td>
</tr>
<tr>
<td>Corrice Patterson</td>
<td>Public Works Director</td>
<td>Village of Palmetto Bay</td>
<td>Municipal Waste Collection Customer</td>
</tr>
<tr>
<td>Damian Ribar</td>
<td>Senior Vice President</td>
<td>Waste Services, Inc.</td>
<td>Solid Waste Industry - Transfer Station Owner</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Largest PWWM Disposal Customer</td>
</tr>
<tr>
<td>Robert Stein</td>
<td>Board Member</td>
<td>Friends of the Everglades</td>
<td>Environmental Group</td>
</tr>
<tr>
<td>Marcellous Stringer</td>
<td>County Union Representative</td>
<td>Miami-Dade County</td>
<td>Subject Matter Expert – Waste Union Local 3292</td>
</tr>
</tbody>
</table>
3.2.2 - THE SWAC

The SWAC consisted of 15 stakeholders representing various community interests. The SWAC members were appointed by the Mayor of Miami-Dade County. Representation on the SWAC can be generally categorized as follows:

- Municipal waste collection and disposal customers
- Homeowner associations
- Environmental groups
- Local business and development interests
- Solid waste industry representatives
- Subject matter experts

Table 3.1 identifies the 15 individuals who volunteered their time and effort to serve on the SWAC.

3.2.3 - SWAC PROCESS

The SWAC Members were provided a description of their role and the process. Figure 3.1 provides an overview of the SWAC process and the primary focus of each of the seven meetings.

3.2.4 - INTRODUCTION

In order for the SWAC members to carry out their work, it was important to first provide each member with an understanding of:

- The County’s solid waste management responsibilities;
- The County’s existing Integrated Solid Waste Management System;
- Who the County’s solid waste customers are (i.e. unincorporated areas, member/contract cities, and private haulers);
- County population and waste generation trends;
- Near-term and long-term factors affecting the System (e.g. existing contracts, System capacity, and legislative mandates);
- The work that had been undertaken and completed in Phase I; and
- The process we would be following throughout Phase II in development of the new 50-year Solid Waste Master Plan.

These items were the subject of the first meeting held on September 26, 2012.

In an effort to provide each SWAC member with a more comprehensive understanding of the System, all members were invited to attend a half-day tour of the County’s solid waste facilities including the:

- Resources Recovery Facility;
- West Transfer Station;
- South Dade Landfill;
- Home Chemical Collection Center (located at the South Dade Landfill site); and
- West Perrine Trash and Recycling Center.

The tour took place on October 18, 2012 with eight SWAC members attending along with PWWM and HDR staff.

In addition to the tour of County’s facilities, all SWAC members were also invited to attend a tour of the WMIF Materials Recovery Facility (MRF) located in Pembroke Pines, Florida. Under a contract with WMI, this facility processes all of the residential curbside recyclables collected by the County. The tour took place on December 12, 2012 with four SWAC members attending the two hour tour along with PWWM and HDR staff.

3.2.5 - SWAC CHAIRMAN

At the beginning of the second work session held on October 24, 2013, the SWAC members elected one of its members, Mr. Morgan Levy, to serve as chair of the committee. The stated roles and responsibilities of the chairperson were to:

- Assist County and the HDR Team in facilitating productive and respectful discussion among the committee members; and
- Support the SWAC recommended scenario through the approval and implementation process.
### Figure 3.2: Solid Waste Master Plan Goal, Objectives, and Policies

**Goal:** Provide solid waste services and facilities that support beneficial land use and growth patterns and economically promote public health, sanitation, environmental protection, and operational efficiency, based on an equitable funding system.

<table>
<thead>
<tr>
<th>Objective 1:</th>
<th>Policy 1.1:</th>
</tr>
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<tbody>
<tr>
<td>Provide solid waste services and facilities to meet existing needs and support growth identified in the Future Land Use Element.</td>
<td>Identify sufficient land available for solid waste facilities and acquire as necessary to implement the County’s solid waste management program over the 50 year planning period.</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Objective 2:</th>
<th>Policy 2.1:</th>
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</thead>
<tbody>
<tr>
<td>Set a high priority on reducing the amount of waste requiring disposal through waste reduction, recycling, and material reuse.</td>
<td>Reduce the amount of waste generated on per capita and business unit basis by 5% by 2026, discouraging use of unnecessary materials</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Objective 3:</th>
<th>Policy 3.1:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Develop and maintain flexibility in the operation of the solid waste management system while protecting the integrity of the system</td>
<td>Provide for the continued development and management of an integrated solid waste management system consisting of a balanced program of recycling, resource recovery, landfilling and other proven technologies found to be suitable in Miami-Dade County and discourage the establishment of facilities not integrated into the system.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Objective 4:</th>
<th>Policy 4.1:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collect, transfer, and transport solid waste as economically as possible while protecting the health and safety of the community.</td>
<td>Provide collection services at a frequency and level of convenience sufficient to protect the health and safety of the community.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Objective 5:</th>
<th>Policy 5.1:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collect, transfer, and transport solid waste as economically as possible while protecting the health and safety of the community.</td>
<td>Develop and operate waste management disposal facilities on the basis of (1) meeting all applicable local, state, and federal environmental rules and regulations, (2) minimizing adverse human and natural environmental impacts, (3) meeting applicable health and safety standards, (4) minimizing development and operation and maintenance costs, and (5) minimizing and economic risk.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Objective 6:</th>
<th>Policy 6.1:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintain programs to responsibility manage and assure safe disposal of household chemicals.</td>
<td>Expand convenient household chemical waste management facilities and programs for use by the general public.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Objective 7:</th>
<th>Policy 7.1:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Develop and maintain an equitable and adequate system of funding solid waste management services to support solid waste management objectives and policies.</td>
<td>Structure solid waste fees and rates to support solid waste management planning policies and objectives, including waste reduction and recycling.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Objective 7:</th>
<th>Policy 7.2:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Identify and evaluate the availability and appropriateness of all potential sources of funding for solid waste management projects and operations</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Objective 7:</th>
<th>Policy 7.3:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Continuously evaluate potential efficiencies and implement those that reduce costs while maintaining adopted service levels.</td>
</tr>
</tbody>
</table>
3.3 - Policy Framework

During the second SWAC work session, a policy framework was developed to help guide the group and their decision-making activities throughout the planning process.

Copies of several existing, BCC approved Miami-Dade County solid waste policy documents were provided to the SWAC members as possible starting points for developing the policy framework for the new Master Plan. Those documents included:

- Miami-Dade County Solid Waste Master Plan (1996);
- Miami-Dade County Comprehensive Development Master Plan; and

Following a review of these documents, it was determined that the policy framework from the 1996 Solid Waste Master Plan was most appropriate to use as a starting point for development of the new policy framework. The SWAC then reviewed, in detail, the stated goal, and each of the objectives and associated policies from the previous master plan to discuss and determine where changes were desired or needed.

The complete policy framework, as developed and adopted by the SWAC, is shown in Figure 3.2 and can also be found in Appendix Q. It includes one overall goal, seven objectives, and a list of policies supporting each of the stated objectives.

3.4 - Evaluation Criteria

During the third meeting, the planning team worked with the SWAC members to develop specific evaluation criteria that would be used to evaluate a list of waste management alternatives that were generated during Phase I of the Master Plan process through a series of public meetings and guidance from the HDR Team and PWWM project managers.

As a starting point for development of the new evaluation criteria, SWAC members were provided with a list of the evaluation criteria used as part of the previous 1996 Solid Waste Master Plan. The SWAC members, together with the planning team, reviewed the previous criteria and evaluated them for consistency with the new policy framework established by the SWAC during the second meeting. Following considerable discussion amongst the SWAC members and the planning team, a new list of six evaluation criteria and corresponding descriptions were adopted. These evaluation criteria are listed below and were deemed to be consistent with the goals, objectives and policies established by the SWAC for the development of the new Master Plan:

- Provides Firm Solid Waste Management Capacity - Reflects how well an alternative provides capacity that can be relied upon now and in the future.
- Contributes to Source Reduction, Reuse, or Recycling and Preserves Landfill Space - Evaluates how well the alternative reduces the waste stream or promotes recycling, reuse of a portion of the waste stream, or preservation of landfill space.
- Environmental Impact - Considers the impact of the alternative on the environment and uncertainties associated with potential environmental impacts. Environmental impacts include air, surface and ground water, biological resources, visual impacts, odor, noise, and cultural resources.
- Compliments Existing System and Facilitates Integrated Waste Management - Evaluates how well the alternative matches the existing County waste management System, the impact on jurisdictions located within the County, the County’s ability to control waste disposal, and the level of flexibility for handling diverse types of waste in the alternative.
- Provides Ability to Maintain System Flexibility - Evaluates the impact of the alternative on the overall flexibility of the County’s solid waste System, such as the ability to implement proven and economical new technologies and operating practices over time.
- Cost - Addresses the average life cycle cost per ton of implementing the alternative. The cost includes capital, replacement, operations, maintenance, and revenue for a period of 20 years, and the present worth of all future costs and revenues.

The final list of six evaluation criteria and their descriptions, as developed and adopted by the SWAC, can also be found in Appendix R.

3.5 - Needs

With the policy framework and evaluation criteria established, the next step in the process was to educate the SWAC members on some of the key planning period factors/needs associated specifically with provision of solid waste services in the County. SWAC members would need to understand and reference these key factors/needs throughout their decision-making processes as they moved toward developing a recommended Master Plan for the County. The following sections provide an overview of each of these key factors...
3.5.1 - WASTE GENERATION

The County’s population is projected to increase significantly over the 50-year planning horizon. Table 3.2 presents Miami-Dade County population projections through the year 2060.

As the County’s population grows, both the total amount of waste generated within the County and the amount of waste that is projected to be managed through the County’s System are also expected to increase. Figure 3.3 illustrates these projections and shows that the amount of waste expected to be managed through the System is projected to nearly double during the 50-year planning horizon, from approximately 1.6 million tons in 2010 to nearly 3.0 million tons in 2060. The new Solid Waste Master Plan would need to be designed to adequately manage these increased waste volumes over the planning period.

Figure 3.3: Solid Waste Projections: Miami-Dade County vs. PWWM System (2010-2060)

Appendix L provides additional detail regarding the population and waste generation projections summarized above.
3.5.2 - RECYCLABLE MATERIALS IN THE WASTE STREAM

A waste composition study was conducted during Phase I. The purpose of the composition study was to assess the quantities of various material types present in the garbage stream\(^2\) delivered to facilities that are part of the System. Figure 3.4 illustrates the findings of the waste composition study in terms of the overall annual composition of garbage delivered County facilities.

**Figure 3.4: Composition of Countywide Garbage (% by weight)**

Among the notable findings was that half (50 percent) of the County’s garbage stream was comprised of potentially recyclable materials, including: recyclable paper (18.9 percent); recyclable containers (10.1 percent); and organics (21.0 percent). This was an important factor for the SWAC to understand and consider when evaluating solid waste management alternatives as part of development of the Master Plan. Other materials that were prevalent in the waste stream included: non-recyclable paper (13.4 percent); hard to recycle plastics such as film and Styrofoam (12.3 percent); and C&D debris (7.9 percent).

Appendix F provides additional detail regarding the methodology and findings associated with waste composition study.

\(^2\) The County’s garbage stream consists of mixed household waste and commercial waste, but does not include materials contained in the County’s trash stream such as yard waste, construction and demolition (C&D) debris, and bulky waste.
3.5.3 - AMOUNT AND TIMING OF WASTE AVAILABLE FOR NEW PROGRAMS
The County has a number of existing contractual commitments related to the management of solid waste. These include an agreement to deliver a minimum of 100,000 tons of waste annually to the Waste Management, Inc. Medley Landfill and an agreement with Covanta Energy to deliver approximately 1.2 million tons of waste annually to the RRF. While these existing disposal contracts are both set to expire within the 50-year planning horizon of the Master Plan (in 2015 and 2023 respectively), the amount of contractually committed waste has been assumed to remain constant throughout the 50-year period for planning purposes.

Figure 3.5 illustrates the amount of contractually committed waste as compared to the amount of waste projected to be managed by the County System each year through 2060. The difference between the two projections is shown in grey as the amount of “available” waste that will need to be managed through new or expanded alternatives in the future. The amount of available waste increases over time along with overall waste generation and grows from an average of approximately 300,000 tons per year during the short-term planning period (2013-2022), to approximately 500,000 tons per year in the mid-term planning period, and finally to more than 1 million tons per year in the long-term planning period (2033-2060).

Figure 3.5: Projected, Committed and Available Waste by Planning Horizon

The tonnage identified as available waste was the material the SWAC focused on throughout the planning process to determine the alternatives that will be used to manage that waste in the future.
The next step in the process was for the SWAC members to individually evaluate and rank each of the 55 potential waste management alternatives that had been generated during Phase I through a series of public meetings and guidance from the HDR Team and PWWM project managers. The following sections describe the evaluation and ranking process in detail.

### 3.6.1 - AVAILABLE ALTERNATIVES

Prior to the SWAC members evaluation of the 55 alternatives, the planning team provided an overview of the four broad categories of waste management methods available to the County for managing the waste that enters the System. Each of the alternatives that the SWAC would be evaluating falls into one of the following waste management categories:

- **Source Reduction and Reuse** - Refers to methods of reducing waste at the source. These can include: reusing or donating items; buying in bulk; reducing packaging; redesigning products; and reducing toxicity.
- **Recycling/Composting** - Collection of used, reused, or unused items that would otherwise be considered waste; sorting and processing the recyclable products into raw materials; and remanufacturing the recycled raw materials into new products. Also includes composting of food scraps, yard trimmings, and other organic materials.
- **Energy Recovery** - Conversion of waste into useable heat, electricity, or fuel through a variety of processes, including: combustion; gasification; pyrolyzation; anaerobic digestion; and landfill gas recovery.
- **Treatment and Disposal** - Includes landfiling and combustion (to reduce the volume of waste).

### 3.6.2 - COUNTY’S EXISTING SYSTEM

The County’s existing System is an integrated solid waste management system that incorporates programs and facilities from three of the four waste management categories listed above including:

- **Source Reduction**
  - ChemAgain program
- **Recycling/Composting**
  - Residential curbside recycling
  - E-waste recycling
  - White goods and metals recycling
  - Used oil recycling
  - Resources Recovery Facility metals recycling
- **Energy Recovery**
  - Resources Recovery Facility
  - Production of biomass fuel
  - Landfill gas-to-energy system
- **Treatment and Disposal**
  - Resources Recovery Facility
  - Landfills

The ChemAgain household chemical reuse program is a relatively new addition to the PWWM menu of solid waste management services and is currently the County’s only program in the Source Reduction category. Details regarding the other County programs and facilities can be found in Section 2.2 and Appendices A-F, which were also provided to each of the SWAC members for their reference as needed.

### 3.6.3 - EVALUATION OF ALTERNATIVES

At the conclusion of the third meeting, all SWAC members were provided with a list of the 55 waste management alternatives that they would be evaluating and ranking in terms of their appropriateness for inclusion in the Master Plan.

The list of alternatives was developed during the public outreach component of Phase I. Input received from the public was summarized and consolidated into 55 alternatives and categorized into one of eight System component categories (Source Reduction; Recycling and Reuse; Collection and Transport–Curbside Waste and Recyclables Collection; Collection and Transport–Transfer Stations; Collection and Transport–TRCs and HC2s; Energy Recovery; Landfill; and Other System Impacts) as shown in Figure 3.6.

Each SWAC member was asked to review the list of alternatives prior to the fourth meeting and provide the planning team with any suggested additions to the list of alternatives if they felt that any potential alternative that warranted inclusion had been overlooked or not included on the list.

During the fourth meeting, each SWAC member was provided with an evaluation matrix prepared by the planning team. This matrix contained: the list of alternatives; a detailed description/definition of each alternative; the implementation period in which each alternative could potentially be put into practice within the County (i.e. short-, mid-, and/or long-term) based on various timing factors such as available waste, permitting, construction, etc.; and guidance concerning how each alternative related to the six evaluation criteria adopted by the SWAC during the third meeting. A copy of this Alternatives Evaluation Matrix can be found in Appendix S.

### 3.6.4 - RANKING OF ALTERNATIVES

The planning team reviewed and discussed each individual alternative in the matrix with the SWAC members, allowing time for questions and discussion regarding each alternative. Once all of the alternatives had been reviewed among the group, each SWAC member was asked to rank the alternatives in terms...
Figure 3.6: Solid Waste Master Plan Alternatives

**Source Reduction:**
1. Encourage home composting of organic waste materials
2. Encourage development of food donation programs
3. Partner with local companies, community organizations, schools, etc. to create a lottery for used and surplus items (e.g. office supplies and equipment)
4. Ban the use of plastic bags
5. Support extended producer responsibility
6. Support packaging for product stewardship (e.g. regulation of excessive and non-reusable/recyclable packaging)
7. Require mandatory deconstruction of buildings and products with reuse of building and product companies

**Recycling and Reuse:**
8. Institute a mandatory organics separation and composting programs
9. Expand recyclables accepted by the existing curbside recycling program
10. Encourage recycling programs for the County’s Public Schools System
11. Develop an information program to increase the public’s awareness of available recycling program’s
12. Provide incentives to vendors for using recycled products
13. Recycle RRF ash

**Collection and Transport - Curbside Waste and Recyclables Collections:**
14. Change the frequencies of garbage, bulky waste and recyclables collection (e.g. once per week, every other week, etc.)
15. Place waste carts on one side of the street
16. Institute a variable rate system to charge residents by weight or volume
17. Require County collection of waste from other County departments
18. Charge a fee for bulky waste collection service
19. Provide more residential enforcement of solid waste rules
20. Require County collection of multi-family and commercial waste

**Collection and Transport - Transfer Stations:**
21. Reduce operating hours/days at transfer stations
22. Provide incentive for haulers/municipalities to deliver waste to a specific transfer/disposal location
23. Adjust transfer fees to fully cover cost
24. Redesign transfer stations to allow for more efficient operations (e.g. material separation, eliminate compactors, expanding tipping floors, etc.)

**Collection and Transport - Trash and Recycling Centers (TRCs) and Household Chemical Collection Center:**
25. Reduce the operating hours/days at TRCs
26. Charge a fee for service area customers and/or non-service area customers at the TRCs
27. Redesign the TRCs to allow for more efficient operations (e.g. use of transfer trailers, compactors, material separation, etc.)
28. Site additional home chemical waste facilities

**Energy Recovery:**
29. Construct a new mass burn WTE/EFW facility at an existing solid waste site or other site
30. Redesign the RRF to allow for more efficient operations (e.g. expand unders buildings, expand trash tipping floor, expand the garbage tipping floor, etc.)
31. Construct a pyrolysis/plasma arc or gasification facility (e.g. use emerging technologies)
32. Construct a bioethanol production facility

**Landfill:**
33. Construct a bio-reactor landfill (e.g., South Dade landfill)
34. Construct a new Class I landfill
35. Construct a new Class II landfill
36. Construct a wind or solar panel farm at existing/ closed landfill
37. Mine active and closed County Landfills to recover additional waste disposal capacity, soil, and recyclable materials
38. Recover recyclable materials at active landfills
39. Close one or more existing landfills (e.g. North Dade, South Dade, Ashfill)
40. Expand existing and activate/expand closed landfills (e.g. North Dade, South Dade, Ashfill, 58th Street, Old South Dade)
41. Maximize the use of non-County owned disposal facilities to preserve existing County-owned landfill space includes waste transfer
42. Adopt policy against new landfill construction in Miami-Dade County

**Other System Impacts:**
43. Bring heavy equipment maintenance in-house (PWWM Staff)
44. Transition from County-owned disposal facilities to long-term waste disposal agreements with other providers
45. Have only one disposal rate as opposed to the current contract versus non-contract rates
46. Lower cost by modifying the union agreement regarding pay and overtime
47. Institute economic, contractual and/or regulatory waste flow control
48. Charge a disposal impact fee
49. Charge a partial or full disposal assessment on property tax (“special assessment district”)
50. Create a municipal or regional solid waste authority
51. Create a regional solid waste disposal entity including Miami-Dade County and one or more of the following counties: Monro, Broward and Palm Beach
52. Encourage municipalities to renew their long-term agreements for use of the County solid waste management systems; consider an incentive
53. Charge a unified fee for use of all County facilities
54. Charge a dumpster permit fee
55. Increase the Disposal Facility Fee (DFF)
of how well they addressed each of the six evaluation criteria that had been established by the group.

This was accomplished by providing each SWAC member with a set of score sheets (one for each of the eight System component categories (i.e. Source Reduction; Recycling and Reuse; Collection and Transport–Curbside Waste and Recyclables Collection; Collection and Transport–Transfer Stations; Collection and Transport–TRCs and HC2s; Energy Recovery; Landfill; and Other System Impacts). The score sheets provided space for each committee member to rank each of the 55 alternatives based on each of the six individual evaluation criteria (i.e. Provides Firm Solid Waste Management Capacity; Contributes to Source Reduction, Reuse, or Recycling and Preserves Landfill Space; Environmental Impact; Compliments Existing System and Facilitates Integrated Waste Management; Provides Ability to Maintain System Flexibility; and Cost) with the possible rankings for each evaluation criteria being:

- 1 = Good
- 2 = Fair
- 3 = Poor

The scores provided by the SWAC members were tabulated and total scores for each alternative were determined by adding the scores across all evaluation criteria. For each alternative, the total scores provided by each SWAC member for that alternative were added together to reach an overall total or “raw” score for each alternative. Score sheets are provided in Appendix T.

To isolate those alternatives with the least SWAC support and remove them from further consideration, for each System component category, the alternative that received the highest (least favorable) raw score was eliminated. In addition, any alternatives that received a score higher than the average raw score (141) plus 0.1 times the standard deviation of all raw scores (19.85) were also eliminated from consideration for the Master Plan. A total of nine alternatives were eliminated from consideration through this process including:

- Require mandatory deconstruction of buildings and products with reuse of building and product components
- Institute a mandatory organics separation and composting program
- Place waste carts on one side of the street
- Require County collection of multi-family and commercial waste
- Adjust transfer fees to fully cover costs
- Charge a fee for service area customers and/or non-service area customers at the TRCs
- Construct a pyrolysis/plasma arc or gasification facility (i.e. use emerging technologies)
- Construct a new Class I landfill
- Create a municipal or regional solid waste authority

3.6.5 - FINAL ALTERNATIVES
The remaining 46 alternatives were further evaluated in order to build three possible Master Plan scenarios.

3.7 - Scenarios

3.7.1 - OVERVIEW
The next step in the Master Plan process was to develop three possible scenarios based on the remaining 46 alternatives. The three scenario themes agreed upon by the planning team and the SWAC included: 1) Least Cost; 2) Environmentally Preferred; and 3) Most Flexible. While each scenario would be somewhat different in terms of the alternatives used and the timing of various programs, each one was developed to provide adequate capacity to manage the projected System waste stream over the next 50 years. It is also important to note that the 12 remaining alternatives under the Other System Impacts category were only used in the scenarios if they were needed in order to reduce operating costs or generate additional revenues in order to make the group of alternatives included in a scenario feasible to implement and fund. This left 34 primary alternatives from which each scenario would be developed.

3.7.2 - LEAST COST SCENARIO
The Least Cost Scenario was designed to manage the waste generated for the lowest overall cost per ton. The HDR Team developed 20-year financial evaluations for each of the 34 primary alternatives.3 As applicable, the financial evaluation of each alternative included: projected System capacity impact (i.e. the alternative’s projected impact on the tons of waste managed by the System in a given year); projected operating revenues; projected capital expenses (e.g. land, buildings/facilities, equipment/vehicles); projected operating and maintenance expenses; and estimated debt service.4 The 20-year financial projections were used to calculate a net cost (or savings) per ton managed for each alternative. This projected cost (or savings) per ton was used to select the alternatives that would be included in the Least Cost Scenario.

3 There are a few alternatives for which financial evaluations were not developed because the alternatives were not implementable during the 20-year financial projection period. These are discussed in greater detail in Section 3.7.

4 Section 3.8 contains additional details regarding the financial projections associated with each alternative.
Figure 3.7 contains a list of the alternatives that were included in the Least Cost Scenario.

**Figure 3.7: Solid Waste Master Plan Alternatives Included in the Least Cost Scenario**

- **Source Reduction:**
  - Encourage home composting of organic waste materials
  - Ban the use of plastic bags

- **Recycling and Reuse:**
  - Expand recyclables accepted by the curbside recycling program
  - Develop an information program to increase the public’s awareness of recycling programs
  - Recycle RRF ash

- **Collection and Transport - Curbside Waste and Recyclables Collections:**
  - Require County collection of waste from other County departments

- **Collection and Transport - Trash and Recycling Centers:**
  - Redesign the TRCs to allow for more efficient operations (e.g. use of transfer trailers, compactors, material separation, etc.)

- **Landfill:**
  - Recover recyclable materials at active landfills
  - Expand existing and activate/expand closed landfills (South Dade, Old South Dade and 58th Street Main Landfills)
  - Maximize the use of non-County owned disposal facilities to preserve existing County-owned landfill space (includes out-of-County waste transfer)

Figure 3.8 provides a graphic representation of how the waste is managed under the Least Cost Scenario over the 50-year planning horizon.

**Figure 3.8: Least Cost Scenario: How is the Waste Managed?**
3.7.3 - ENVIRONMENTALLY PREFERRED SCENARIO

The Environmentally Preferred Scenario manages the waste generated by using the alternatives most favorably ranked by the SWAC in regard to the following evaluation criteria:

- Environmental impact; and
- Contribution to source reduction, reuse, recycling and preservation of landfill space.

As such, in determining the alternatives that would be included in this scenario, the HDR Team weighted the alternative scores provided by the SWAC so as to give greater weight to the scores assigned to the above two criteria. The weightings used in building this scenario are outlined in Table 3.3. The process gave the most weight (35 percent) to each of the two environmentally related criteria, a somewhat lower weight (15 percent) to the criterion related to provision of capacity, and the lowest weight (5 percent) to each of the remaining three criteria. This methodology allowed the scenario to take the SWAC’s scores related to each of the criteria into account, while placing greater emphasis on those related to the environment.

Table 3.3: Weighting of SWAC Scores Used to Develop Environmentally Preferred Scenario

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Weighting</th>
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<tbody>
<tr>
<td>Provides firm solid waste management capacity</td>
<td>15%</td>
</tr>
<tr>
<td>Contributes to source reduction, reuse, or recycling and preserves landfill space</td>
<td>35%</td>
</tr>
<tr>
<td>Environmental impact</td>
<td>35%</td>
</tr>
<tr>
<td>Compliments existing System and facilitates integrated waste management</td>
<td>5%</td>
</tr>
<tr>
<td>Provides ability to maintain System flexibility</td>
<td>5%</td>
</tr>
<tr>
<td>Cost</td>
<td>5%</td>
</tr>
</tbody>
</table>

As previously noted, a key part of the planning process was to ensure that each of the three scenarios were developed in such a way that they would provide adequate capacity to manage the projected System waste stream over the next 50 years. To reflect the importance of this factor, the criterion related to providing firm solid waste management capacity was given a higher weighting of 15 percent, rather than 5 percent.
Figure 3.9 contains a list of the alternatives that were included in the Environmentally Preferred Scenario based on the above weighting of the SWAC’s scores.

**Figure 3.9: Solid Waste Master Plan Alternatives Included in the Environmentally Preferred Scenario**

<table>
<thead>
<tr>
<th>Source Reduction:</th>
<th>Collection and Transport - Transfer Stations:</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Ban the use of plastic bags</td>
<td>▪ Reduce operating hours at transfer stations</td>
</tr>
<tr>
<td>▪ Support packaging for product stewardship - regulation of excessive and non-reusable/recyclable packaging</td>
<td>▪ Redesign transfer stations to allow for more efficient operations (e.g. material separation, eliminate compactors, expand tipping floors, etc.)</td>
</tr>
<tr>
<td>▪ Encourage home composting of organic waste materials</td>
<td></td>
</tr>
<tr>
<td>▪ Partner with local companies, community organizations, schools, etc. to create a lottery for used and surplus items</td>
<td></td>
</tr>
<tr>
<td>▪ Encourage development of food donation programs</td>
<td></td>
</tr>
<tr>
<td>▪ Support extended producer responsibility (EPR)</td>
<td></td>
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<tr>
<td>▪ - producer internalization of societal cost of its products downstream, including “take back” programs</td>
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<table>
<thead>
<tr>
<th>Recycling and Reuse:</th>
<th>Collection and Transport - Trash and Recycling Centers:</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Develop an information program to increase the public’s awareness of recycling programs</td>
<td>▪ Site additional home chemical waste facilities</td>
</tr>
<tr>
<td>▪ Encourage recycling programs for the County’s Public School System</td>
<td>▪ Redesign the TRCs to allow for more efficient operations (e.g. use of transfer trailers, compactors, material separation, etc.)</td>
</tr>
<tr>
<td>▪ Recycle RRF ash</td>
<td>▪ Reduce the operating hours/days at the TRCs</td>
</tr>
<tr>
<td>▪ Expand recyclables accepted by the curbside recycling program</td>
<td></td>
</tr>
<tr>
<td>▪ Provide incentives to vendors for using recycled products</td>
<td></td>
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</tbody>
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<thead>
<tr>
<th>Collection and Transport - Curbside Waste and Recyclables Collections:</th>
<th>Landfill:</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Provide more residential enforcement of solid waste rules</td>
<td>▪ Recover recyclable materials at active landfills</td>
</tr>
<tr>
<td>▪ Institute a variable rates system to charge residents by weight or volume</td>
<td>▪ Construct a wind or solar panel farm at existing/ closed landfills</td>
</tr>
<tr>
<td>▪ Change the frequencies of garbage, bulky waste and recyclables collection (e.g. once per week, twice per week, every other week, etc.)</td>
<td>▪ Mine active and closed County landfills to recover additional waste disposal capacity, soil, and recyclable materials</td>
</tr>
<tr>
<td>▪ Charge a fee for bulky waste collection service</td>
<td>▪ Adopt policy against new landfill construction in Miami-Dade County</td>
</tr>
<tr>
<td>▪ Require County collection of waste from other County departments</td>
<td>▪ Maximize the use of non-county owned disposal facilities to preserve existing county-owned landfill space (includes waste transfer)</td>
</tr>
<tr>
<td></td>
<td>▪ Close one or more existing landfills (North Dade)</td>
</tr>
<tr>
<td></td>
<td>▪ Construct a bio-reactor landfill (South Dade landfill)</td>
</tr>
<tr>
<td></td>
<td>▪ Expand existing and activate/expand closed landfills (South Dade, Old South Dade and 58th Street Main Landfills)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Energy Recovery</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Redesign the RRF to allow for more efficient operations (e.g. expand unders building, expand trash tipping floor, etc.)</td>
<td></td>
</tr>
<tr>
<td>▪ Construct a new mass burn WTE/EFW facility at an existing solid waste site or other site</td>
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</table>
Figure 3.10 provides a graphic representation of how the waste is managed under the Environmentally Preferred Scenario over the 50-year planning horizon.

**Figure 3.10: Environmentally Preferred Scenario: How the Waste is Managed**

3.7.4 - MOST FLEXIBLE SCENARIO

The Most Flexible Scenario manages the waste generated by using the alternatives most favorably ranked by the SWAC in regard to the following evaluation criteria:

- Complimenting the County’s existing System and facilitates; and
- Providing ability to maintain System flexibility.

As such, in determining the alternatives that would be included in this scenario, the HDR Team weighted the alternative scores provided by the SWAC so as to give greater weight to the scores assigned to the above two criteria. The weightings used in building this scenario are outlined in Table 3.4. The process gave the most weight (35 percent) to each of the two system flexibility related criteria, a somewhat lower weight (15 percent) to the criterion related to provision of capacity, and the lowest weight (5 percent) to each of the remaining three criteria. This methodology allowed the scenario to take the SWAC’s scores related to each of the criteria into account, while placing greater emphasis on those related to system flexibility.

As previously noted, a key part of the planning process was to ensure that each of the three scenarios were developed in such a way that they would provide adequate capacity to manage the projected System waste stream over the next 50 years. To reflect the importance of this factor, the criterion related to providing firm solid waste management capacity was given a higher weighting of 15 percent, rather than 5 percent.
Table 3.4: Weighting of SWAC Scores Used to Develop Most Flexible Scenario

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Weighting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provides firm solid waste management capacity</td>
<td>15%</td>
</tr>
<tr>
<td>Contributes to source reduction, reuse, or recycling and preserves landfill space</td>
<td>5%</td>
</tr>
<tr>
<td>Environmental impact</td>
<td>5%</td>
</tr>
<tr>
<td>Compliments existing System and facilitates integrated waste management</td>
<td>35%</td>
</tr>
<tr>
<td>Provides ability to maintain System flexibility</td>
<td>35%</td>
</tr>
<tr>
<td>Cost</td>
<td>5%</td>
</tr>
</tbody>
</table>

Figure 3.11 contains a list of the alternatives that were included in the Most Flexible Scenario based on the above weighting of the SWAC’s scores.

**Figure 3.11: Solid Waste Master Plan Alternatives Included in the Most Flexible Scenario**

**Source Reduction:**
- Ban the use of plastic bags
- Support packaging for product stewardship - regulation of excessive and non-reusable/recyclable packaging.
- Partner with local companies, community organizations, schools, etc. to create a lottery for used and surplus items
- Support extended producer responsibility (EPR) - producer internalization of societal cost of its products downstream, including “take back” programs
- Encourage home composting of organic waste materials
- Encourage development of food donation programs

**Recycling and Reuse:**
- Develop an information program to increase the public’s awareness of recycling programs
- Encourage recycling programs for the County’s Public School System
- Expand recyclables accepted by the curbside recycling program
- Recycle RRF ash
- Provide incentives to vendors for using recycled products

**Collection and Transport - Curbside Waste and Recyclables Collections:**
- Provide more residential enforcement of solid waste rules
- Change the frequencies of garbage, bulky waste and recyclables collection (e.g. once per week, twice per week, every other week, etc.)
- Charge a fee for bulky waste collection service
- Institute a variable rates system to charge residents by weight or volume
- Require County collection of waste from other County departments

**Collection and Transport - Transfer Stations:**
- Redesign transfer stations to allow for more efficient operations (e.g. material separation, eliminate compactors, expand tipping floors, etc.)
- Reduce operating hours at transfer stations

**Collection and Transport - Trash and Recycling Centers:**
- Site additional home chemical waste facilities
- Redesign the TRCs to allow for more efficient operations (e.g. use of transfer trailers, compactors, material separation, etc.)
- Reduce the operating hours/days at the TRCs

**Landfill:**
- Recover recyclable materials at active landfills
- Mine active and closed County Landfills to recover additional waste disposal capacity, soil, and recyclable materials
- Construct a wind or solar panel farm at existing/closed landfills
- Maximize the use of non-county owned disposal facilities to preserve existing county-owned landfill space (includes waste transfer)
- Adopt policy against new landfill construction in Miami-Dade County

**Energy Recovery**
- Construct a new mass burn WTE/EFW facility at an existing solid waste site or other site
Figure 3.12 provides a graphic representation of how the waste is managed under the Most Flexible Scenario over the 50-year planning horizon.

**Figure 3.12: Most Flexible Scenario: How the Waste is Managed**

![Graphic representation of waste management under the Most Flexible Scenario](image)

### 3.8 - Financial Evaluation of Scenarios

The final step in evaluating each of the three scenarios (Least Cost, Environmentally Preferred, and Most Flexible) was to examine the projected financial impacts that each group of proposed alternatives included in the scenarios would have on the County’s System.

In order to determine the projected financial impacts associated with each scenario, the HDR Team first developed a 20-year financial evaluation or modified cost/benefit analysis (CBA) for each of the 34 primary alternatives. As applicable, the CBA for each alternative included: projected system capacity impact (i.e. the alternative’s projected impact on the tons of waste managed by the PWWM system in a given year); projected operating revenues; projected capital expenses (e.g. land, buildings/facilities, equipment/vehicles); projected operating and maintenance expenses; and estimated debt service. Twenty-year financial evaluations were not developed for a few of the 34 primary alternatives due to the fact that they were not implementable during the 20-year financial projection period for various reasons. The alternatives for which 20-year CBAs were not developed included:

- Provide incentives for haulers/municipalities to deliver waste to a specific transfer/disposal location - Fee structures and other restrictions embedded in the County’s existing waste disposal agreements with both public and private entities would make this alternative extremely difficult to implement in the short- to mid-term (0-20 years).
- All of the Energy Recovery alternatives – A number of factors including a lack of sufficient quantities of available waste; anticipated permitting, design, and construction timelines; and in some cases unproven technological processes and results would make implementation of any of the following alternatives extremely difficult in the short- to mid-term (0-20 years):
  - Construct a new mass burn WTE/EFW facility at an existing solid waste site or other site
  - Redesign the RRF to allow for more efficient operations (e.g. expand unders building, expand trash tipping floor, expand the garbage tipping floor, etc.)
  - Construct a pyrolysis/plasma arc or gasification facility (i.e. use emerging technologies)
  - Construct a bioethanol production facility

For all other remaining alternatives, a modified 20-year CBA was developed. The following section provides a brief description of the methodology and approach used to develop the modified CBA for each alternative.
3.8.1 - CBA METHODOLOGY AND APPROACH

Timing of Implementation and Duration
Consideration was given to the timing of implementation for each alternative. Many of the alternatives identified would require several months or years to fully implement. Therefore, where appropriate the CBA allows for the “ramping up” of the anticipated impact of programs and initiatives. Similarly, many of the alternatives have a limited duration. Again, where appropriate the CBA allows for the termination of costs and benefits during the 20-year projection period to more accurately reflect the anticipated impact(s).

Potential Impact to Solid Waste Disposal Capacity
For each alternative, System specific data and information provided by the PWWM was combined with other industry resources to develop key variables relative to the anticipated impact to volumes of solid waste materials disposed of in a PWWM facility. For example, the Source Reduction category includes an alternative for encouraging home composting of organic waste materials. To develop an estimate of the potential impact on solid waste disposal volumes an assumption was made regarding the percentage of single-family residential solid waste tonnage that is comprised of organic materials (i.e. yard waste and food waste). Applying an estimated diversion rate for home composting programs (as published in the US Composting Council, National Backyard Composting Program Cost-Benefit Analysis of Home Composting Programs in the United States) to the organics tonnage resulted in an estimate of disposal volumes to be diverted by this program. A similar approach was taken for each respective alternative to develop an estimate of the volume of solid waste tonnage that is expected to be diverted/avoided as well as the timing and duration of the anticipated impact.

Potential Impact to Solid Waste Operating Expenses
The CBA includes an estimate of each alternative’s effect on the System’s annual operating expenses. The CBA accounts for each respective alternative’s estimated impact to costs associated with such operating expenses as labor, fuel or vehicle maintenance. For example, certain alternatives consider the impact of redesigning the PWWM’s transfer stations to allow for more efficient operations. The annual net impact to operating expenses was calculated based on savings realized from decreased cost associated with compactor operations and increased cost associated with trucking. Unit costs and key variables were developed from actual System data and other industry sources. Where appropriate, unit costs and certain variables were escalated through the 20-year projection period to allow for inflationary pressures.

Potential Need for Capital Investment
While not all alternatives necessitate the addition of capital equipment, certain alternatives would require significant investment. The CBA identifies the estimated investment in land, facilities, vehicles and/or equipment for each alternative. The analyses involved calibrating the timing of the investment to the assumed implementation schedule. In addition, based on an estimation of useful life certain assets would need to be replaced during the projection period. For purposes of this study the following estimated useful lives were assumed:

Appendix U contains the detailed financial evaluation worksheets by alternative as well as information regarding the sources of data and information and the assumptions used in developing the potential impact to System operating expenses.
Table 3.5: Estimated Useful Life of Capital Purchases

<table>
<thead>
<tr>
<th>Description</th>
<th>Estimated Useful Life (Years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collection Bins</td>
<td>5</td>
</tr>
<tr>
<td>Facilities</td>
<td>30</td>
</tr>
<tr>
<td>Collection Trucks</td>
<td>7</td>
</tr>
<tr>
<td>Multi-Material Recycling Containers</td>
<td>5</td>
</tr>
<tr>
<td>1-Cy C&amp;D Containers</td>
<td>5</td>
</tr>
<tr>
<td>40-Cy Containers</td>
<td>5</td>
</tr>
<tr>
<td>Self-Contained Compactors</td>
<td>5</td>
</tr>
<tr>
<td>HC2 Equipment &amp; Containers Cost</td>
<td>5</td>
</tr>
<tr>
<td>Rolling Stock Equipment</td>
<td>7</td>
</tr>
</tbody>
</table>

Future Debt Associated with Proposed Alternatives

For purposes of the CBA, it was assumed that capital investments would be funded with debt. The interest rate used in the calculations of annual debt service payments was 4.00% and the term of each respective loan was reconciled to the estimated useful life shown in the above table.

3.8.2 - DEVELOPMENT OF FINANCIAL EVALUATIONS FOR EACH SCENARIO

The CBA methodology outlined above was applied to each of the 34 primary alternatives and a 20-year projection of the net cost/benefit was developed. The next step was to develop the financial evaluations for each of the three scenarios. As previously described in Section 3.6, the HDR Team utilized the scoring sheets provided by the SWAC to determine which specific alternatives would ultimately be included in each scenario.

The costs and benefits for those alternatives included in each scenario were tabulated and totaled to arrive at an estimated impact to solid waste disposal volumes and the overall financial impact for each scenario.

3.8.3 - INTEGRATION OF CBA WITH AVAILABLE FINANCIAL RESOURCES

Once the estimated net overall financial impact for each scenario was derived from the CBA, it was compared to the financial resources projected to be available to the PWMM under the most current System financial model and projections available at the time. The purpose in making such comparison was to identify whether PWMM would have the ability to fund the proposed programs/alternatives from:

- Current operations and cash reserves;
- Anticipated customer rate increases included in the PWMM financial projections; and
- Any incremental revenue realized as a result of the implementation of the alternatives included in the given scenario.

The PWMM financial model assumed that the total annual customer rate would remain at $439 per household through FY 2021, with a 21 percent rate increase in FY 2022 ($530), another 9.5 percent rate increase in FY 2024 ($580), and several smaller percent increases from FY 2028-FY 2032, bringing the projected annual customer rate to $670 by the end of the 20-year financial projection period contemplated within this Master Plan. The HDR Team’s analysis assumed no further adjustments to customer rates during the projection period beyond those already contemplated in the PWMM financial model. It did, however, include an annual inflation factor of 1.64 percent for disposal fees.

If additional measures, beyond those outlined above, were needed in order to reduce operating costs or generate additional revenues in order to make the group of alternatives included in a scenario financially feasible, the HDR Team then incorporated one or more of the 12 Other System Impacts alternatives into the scenario (in the order of their SWAC ranking) until the System was made financially whole.

Two of the three scenarios would ultimately require the use of one or more of the Other System Impacts alternatives in order to make the scenarios financially feasible over the 20-year financial projection period. Among the Other System Impacts alternatives, the following were consistently ranked among the most favorable by the SWAC:

- Bring heavy equipment maintenance in-house (PWMM Staff)
- Encourage municipalities to renew their long-term agreements for use of the County solid waste management system
- Charge a unified fee for use of all county facilities
- Charge a disposal impact fee
- Increase the Disposal Facility Fee
- Institute economic, contractual and/or regulatory waste flow control
- Charge a dumpster permit fee
- Charge a partial or full disposal assessment on property tax (“special assessment district”)

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The financial model, provided by PWMM and its financial consultant, PEG, utilized actual fiscal year end numbers for FY 2001 through mid-year FY 2010, as well as budgeted numbers for FY 2011, to develop departmental projections extending through FY 2060.
3.8.4 - RESULTS OF SCENARIO FINANCIAL EVALUATIONS

Appendix U contains detailed financial results for each of the three scenarios. These financial projections were developed as planning tools to provide the SWAC and the County with an understanding of the projected relative financial impacts associated with implementation of each of the three scenarios. Many assumptions had to be made in order to generate the scenario financial comparisons (i.e. specific costs, timing, implementation methods, etc.). For comparison purposes, these assumptions were kept consistent across scenarios as appropriate. However, changes to any of these factors would result in actual financial outcomes that would vary somewhat from the planning projections developed for the purposes of this Master Plan.

The following tables provide summaries of the projected net annual financial impacts associated with each of the three scenarios over the 20-year financial projection period. Each scenario is first presented in terms of its projected financial impact without the addition of any of the Other System Impacts alternatives; then, if necessary, the projected financial impact including any necessary Other System Impacts alternatives are presented if they are needed in order to reduce costs or generate additional revenue to fund the System.

**Least Cost Scenario**

Figure 3.13 provides a graphical summary of the estimated net annual financial impact of the Least Cost Scenario. This graph illustrates that implementation of the Least Cost Scenario would result in annual System cost savings in FY 2013-FY2020 as compared to the System as it is currently operated. However, implementation of the scenario would begin to add additional cost to the System beginning in FY 2021.

*Figure 3.13: Net Annual Financial Impact of Least Cost Scenario*

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8 The financial projections presented do not include revenues or expenses associated with alternatives implemented beyond the 20-year financial projection period.
Figure 3.14 presents the projected net annual operating results (annual revenues minus expenses) under the Least Cost Scenario as compared to projected results under the existing System.

**Figure 3.14: Net Results from Operations - Least Cost Scenario vs. Existing System**

Based on the CBA the Least Cost Scenario would have a positive net present value (NPV) of approximately $295 million over the 20-year financial projection period. Overall, implementation of the Least Cost Scenario would be expected to generate an average savings to the System of approximately $18.70 per ton of waste managed over the 20-year financial projection period as compared to projected costs under the System as it is currently operated.

**Environmentally Preferred Scenario**

Figure 3.15 provides a graphical summary of the estimated net annual financial impact of the Environmentally Preferred Scenario without any Other System Impacts alternatives included in the scenario. This graph illustrates that implementation of the Environmentally Preferred Scenario would result in additional System costs in all years except FY 2013 and FY 2024-FY 2026 when compared to the System as it is currently operated.
Figure 3.15: Net Annual Financial Impact of Environmentally Preferred Scenario (Without Other System Impacts Alternatives)

Figure 3.16 presents the projected net annual operating results (annual revenues minus expenses) under the Environmentally Preferred Scenario without the inclusion of any Other System Impacts alternatives as compared to projected results under the existing System.

Figure 3.16: Net Results from Operations – Environmentally Preferred Scenario (Without Other System Impacts Alternatives) vs. Existing System

Based on the CBA the Environmentally Preferred Scenario (without any of the Other System Impacts alternatives included) would have a negative NPV of approximately -$254 million over the 20-year financial projection period. Overall, implementation of the Environmentally Preferred Scenario (without any of the Other System Impacts
alternatives included) would require the County to generate average additional revenues of approximately $18.90 per ton of waste managed over the 20-year financial projection period in order to adequately fund the System.

In order to bridge this projected funding gap and make the scenario financially feasible, the HDR Team incorporated the following six Other System Impacts alternatives into the scenario (in the order of their SWAC ranking):

- Bring heavy equipment maintenance in-house (PWWM staff);
- Charge a unified fee for use of all county facilities;
- Encourage municipalities to renew their long-term agreements for use of the county solid waste management system;
- Charge a disposal impact fee;
- Have only one disposal rate as opposed to the current contract vs. non-contract rates; and
- Charge a partial or full disposal assessment on property tax.

Figure 3.17 provides a graphical summary of the estimated net annual financial impact of the Environmentally Preferred Scenario including the Other System Impacts alternatives listed above. This graph illustrates that implementation of the Environmentally Preferred Scenario would result in additional System revenues or savings in all years except FY 2021-FY2023 as compared to the System as it is currently operated.

*Figure 3.17: Net Annual Financial Impact of Environmentally Preferred Scenario*
Figure 3.18 presents the projected net annual operating results (annual revenues minus expenses) under the Environmentally Preferred Scenario when the Other System Impacts alternatives are included as compared to projected results under the existing System.

**Figure 3.18: Net Results from Operations – Environmentally Preferred Scenario vs. Existing System**

Based on the CBA the Environmentally Preferred Scenario (including the Other System Impacts alternatives) would have a positive NPV of approximately $335 million over the 20-year financial projection period. Overall, implementation of the Environmentally Preferred Scenario (including the Other System Impacts alternatives) would be expected to generate average additional revenue or savings to the System of approximately $25.29 per ton of waste managed over the 20-year financial projection period as compared to projections for the System as it is currently operated.

**Most Flexible Scenario**

Figure 3.19 provides a graphical summary of the estimated net annual financial impact of the Most Flexible Scenario without any Other System Impacts alternatives included in the scenario. This graph illustrates that implementation of the Most Flexible Scenario would result in additional System costs in ten of the next twenty years as compared to the System as it is currently operated.
Figure 3.19: Net Annual Financial Impact of Most Flexible Scenario (Without Other System Impacts Alternatives)

Figure 3.20 presents the projected net annual operating results (annual revenues minus expenses) under the Most Flexible Scenario without the inclusion of any Other System Impacts alternatives as compared to projected results under the existing System.

Figure 3.20: Net Results from Operations – Most Flexible Scenario (Without Other System Impacts Alternatives) vs. Existing System
Based on the CBA the Environmentally Preferred Scenario (without any of the Other System Impacts alternatives included) would have a negative NPV of approximately -$85 million over the 20-year financial projection period. Overall, implementation of the Environmentally Preferred Scenario (without any of the Other System Impacts alternatives included) would require the County to generate average additional revenues of approximately $7.73 per ton of waste managed over the 20-year financial projection period in order to adequately fund the System.

In order to bridge this projected funding gap and make the scenario financially feasible, the HDR Team incorporated the following five Other System Impacts alternatives into the scenario (in the order of their SWAC ranking):

- Bring heavy equipment maintenance in-house (PWWM staff);
- Encourage municipalities to renew their long-term agreements for use of the county solid waste management system;
- Charge a unified fee for use of all county facilities;
- Charge a disposal impact fee; and
- Institute economic, contractual and/or regulatory waste flow control.

Because implementation of waste flow control can take many different forms (i.e. economic; contractual; or legal provisions that allow the County to designate the facilities to which waste generated within the County is taken for processing, treatment or disposal), the HDR Team could not develop a financial evaluation specific to that alternative. Due to this limitation, Figures 3.21 and 3.22 below do not include the financial impact of including the waste flow control alternative in the scenario. However, the NPV of the Most Flexible Scenario would be positive assuming that the County was able to generate at least roughly $12.3 million dollars in additional revenues over the 20-year financial projection period from the implementation of flow control measures.

Figure 3.21 provides a graphical summary of the estimated net annual financial impact of the Most Flexible Scenario including the Other System Impacts alternatives listed above (with the exception of the waste flow control alternative).

**Figure 3.21: Net Annual Financial Impact of Most Flexible Scenario**

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Implementing waste flow control would allow the County to assure the financial viability of waste management facilities by providing a reliable, long-term supply of waste. This assurance can be instrumental in securing capital to finance the construction of facilities, and ensure funding for various components of the solid waste management system. Flow control can also help facilitate solid waste planning and management, since it allows a jurisdiction to plan for the appropriate type, number, and size of facilities to handle the long-term generation of waste within its service area. The State of Florida specifically allows local governments to use flow control to designate facilities where waste must be managed, and to require mandatory participation in municipal solid waste management services. However, flow control remains a heavily debated issue since it can lead to designated facilities having monopolies on local waste and/or recoverable materials.
Figure 3.22 presents the projected net annual operating results (annual revenues minus expenses) under the Most Flexible Scenario when the Other System Impacts alternatives (with the exception of the waste flow control alternative) are included as compared to projected results under the existing System. Additional revenues from flow control measures would be needed to make this scenario financially feasible.

**Figure 3.22: Net Results from Operations – Most Flexible Scenario vs. Existing System**

Based on the CBA the Most Flexible Scenario (including the Other System Impacts alternatives) would have a positive NPV over the 20-year financial projection period, assuming that the County could generate at least roughly $12.3 million dollars in additional revenues over the period from the implementation of flow control measures.

### 3.8.5 - RELATIONSHIP BETWEEN THE MASTER PLAN AND RATES AND FEES

System waste disposal rates are adjusted annually for increases or decreases in the Consumer Price Index (CPI). These rates are imbedded in the County’s disposal contracts with municipalities and private haulers and cannot be increased beyond CPI, unless the increase is directly associated with a change-in-law (e.g., environmental or safety regulation). Disposal rates are paid either directly or indirectly by all System customers, including County residents that currently pay a $439 annual household waste collection fee (waste fee).

Increases or decreases in the waste fee are driven primarily by costs such as: labor; fuel; disposal rates; capital equipment; and fleet maintenance. The waste fee can also be affected by efficiencies such as: changes in technology (e.g., automated waste collection vehicles, transitioning to compressed natural gas powered fleet equipment, automated routing and TRC access control) and changes in service delivery (e.g., once-per-week garbage collection, shifting bulky waste pickups to a calendar year basis, separate charges for bulky waste pickups, additional waste cart service, use of TRCs, etc.).

As the Solid Waste Master Plan is implemented, its disposal costs must be absorbed by disposal revenues. As mentioned above, disposal rates are adjusted each year to keep pace with inflation, but cannot otherwise be increased except for a change-in-law. To the extent that costs associated with implementation of a particular Master Plan disposal alternative or group of alternatives outpaces inflation or is not associated with a change-in-law, a decision will have to be made to either find efficiencies to reduce costs or develop other revenue sources to cover costs above the CPI. This has been done in the past with development of the Disposal Facility Fee, which is a fifteen percent (15%) fee charged on gross receipts of private waste haulers operating in the Disposal Facility Fee Area (i.e., the unincorporated area of the County as it existed in 1996), and funding landfill closure costs from a portion of the Utility Service Fee, which is a seven and one-half percent (7.5%) fee charged on water and sewer bills.
Since the waste fee is affected by disposal rates, which are adjusted annually for inflation, as well as the other cost drivers mentioned above, which are also affected by inflation, upward pressure on the waste fee will always be a factor during the Master Plan implementation period, just as it is today. The PWWM will continue to be challenged to find efficiencies and/or make changes in service delivery to keep the waste fee as low as possible, while continuing to provide the high quality waste collection services expected by our customers.

### 3.8.6 - DEBT SERVICE COVERAGE

As of the end of FY 2011-12, the PWWM had approximately $150 million in outstanding long-term debt. The Department’s bond covenants require it to maintain a debt service coverage ratio of one-hundred twenty percent (120%), meaning Net Operating Revenues in each fiscal year must equal or exceed 120% of the annual principal and interest requirements on the bonds. This requirement can be met with a combination of waste collection and disposal revenues (i.e. System revenues). Since the PWWM’s ability to raise disposal rates is restricted, the debt service coverage requirement also places upward pressure on the waste fee, which can be adjusted annually by the Board of County Commissioners.

### 3.8.7 - FINANCIAL FORECASTS AND FUTURE RATES AND FEES

While the Master Plan process relied on a financial model to project System costs based on various scenarios for planning purposes, the model is not intended to provide a forecast of future disposal rates or changes in the waste fee. Rather, the purpose of the financial model is to provide a common financial basis for comparing the relative cost of each scenario and determining the extent to which additional revenues, beyond the base case assumptions, will be required to fund each scenario.

### 3.9 - Sustainable Return on Investment (SROI)

In order to build on the financial evaluation and provide additional decision-making tools for the SWAC, a Sustainable Return on Investment (SROI) evaluation was also conducted. Traditional financial evaluation tools rely exclusively on financial impacts, and are not by themselves able to accurately:

- Quantify the non-cash benefits and costs accruing to both the PWWM and to the community as a whole resulting from a specific decision or investment; or
- Incorporate the element of risk and uncertainty into the decision-making process.

The SROI evaluation was used as another tool in the Master Plan process in order to account for these important factors in a measurable way and provide the SWAC members with additional information on which base their decisions.

#### 3.9.1 - OVERVIEW

The SROI process takes into account the entire scope of potential costs and benefits related to sustainability measures, while simultaneously incorporating a risk analysis component over the project’s life-cycle. A key feature of SROI is that it converts to dollar terms (monetizes) the relevant social and environmental impacts of a project yet still provides the equivalent of traditional financial metrics. The financial analysis accounts for internal (i.e. accruing to the organization) cash costs and benefits only, while SROI accounts for internal and external costs and benefits. The SROI evaluation allowed the planning team and the SWAC to gauge the relative sustainability of each of the three scenarios in order to make a more informed decision regarding the recommended plan.

#### 3.9.2 - EVALUATION CRITERIA

An SROI model was developed for each of the three scenarios under consideration by the SWAC. The model used the tons of waste projected to be managed by the System each year during the planning period and allocated the waste according to how it would be managed under the various proposed solid waste management alternatives included in the scenario. The composition of the waste managed was based on the waste composition study performed earlier in the Master Plan process. The energy consumed and produced by each solid waste management alternative (such as fuel used to transport the waste or electricity produced by the RRF) was combined with the waste composition to generate the model output of net energy consumed and air, ground, and water environmental emissions.

The model uses monetary valuations of societal costs and benefits to arrive at a projected Sustainable NPV for each scenario. Some examples of the societal benefits included in the analysis are:

- Habitat for commercial species;
- Habitat for wildlife and visual/cultural benefits;
- Amenity or aesthetic value;
- Recreation value;
- Reduced air, water, or ground pollution;
- Water purification; and
- Non-use and option value.

Some examples of the societal costs included in the analysis are:

- Energy consumed;
- Greenhouse gases, acid gases and smog precursors produced; and
- Heavy metals and organics found in water.
3.9.3 - EVALUATION OF SCENARIOS

Based on the above described inputs and outputs, the cash impacts projected through the financial analysis, a risk analysis, and the monetary valuations of the environmental impacts associated with the alternatives included in each scenario, the SROI model generated results as described in Figures 3.23 and 3.24 below.

Figure 3.23: Projected Sustainable Net Present Value by Scenario

The sustainability benefits associated with increased source reduction and recycling in Scenario 2 (Environmentally Preferred Scenario), result in it having the highest sustainable NPV among the three scenarios considered. Scenarios 1 and 3 are similar to one another in terms of their returns and their risk profiles (similar values for the NPV and similar shapes for the cumulative probability curves), but do not perform as well as Scenario 2.

The same trend can be seen over time in Figure 3.24 with all scenarios very quickly showing positive returns, but with Scenario 2 (Environmentally Preferred Scenario) outperforming Scenarios 1 and 3.
Additional details regarding the SROI evaluation and results can be found in the Sustainability Analysis Report in Appendix V.

Table 3.6 summarizes the results of the financial and sustainable return on investment evaluations in terms of how each of the three scenarios ranked in relation to one another over a 20-year horizon and a 50-year horizon.

**Table 3.6: Financial and Sustainable NPV Ranking by Scenario**

<table>
<thead>
<tr>
<th>20 Year Horizon</th>
<th>50+ Year Horizon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rank</td>
<td>Financial</td>
</tr>
<tr>
<td>1</td>
<td>Scenario 3 Most Flexible</td>
</tr>
<tr>
<td>2</td>
<td>Scenario 1 Least Cost</td>
</tr>
<tr>
<td>3</td>
<td>Scenario 2 Environmental</td>
</tr>
</tbody>
</table>

### 3.9.4 - RESULTS OF EVALUATION/SELECTION OF SCENARIO

The detailed results of the SROI evaluation for each of the three scenarios were presented to the SWAC members during their seventh and final meeting. Based on the information presented, the SWAC reached a consensus and selected Scenario 2, the Environmentally Preferred Scenario, as the one that they felt was most appropriate to address the County’s long-term solid waste management needs.
4.0 IMPLEMENTATION PLAN

4.1 - Overview
The SWAC worked together to reach a consensus on the scenario that should be implemented in Miami-Dade County to manage the solid waste projected to be generated and managed by the System over the next 50 years. That scenario, the Environmentally Preferred Scenario, includes alternatives that will provide the County with a well integrated plan that will complement the existing System. The alternatives included in the selected scenario, when implemented over the planning period, will provide adequate management for the waste that will be generated in the County.

PWWM has reviewed the alternatives included in the Environmentally Preferred Scenario and recommends that the County implement the alternatives. PWWM will review the operational feasibility of each alternative, prior to implementation.

The implementation plan provided in this section is based on the assumption that the waste that is currently obligated through contractual agreements (WTE put or pay and the put or pay agreement with WMIF) will continue to be managed through the planning period in the same manner.

4.2 - Description of Selected Scenario
Scenario 2, the Environmentally Preferred Scenario, was selected by the SWAC to manage Miami-Dade County's waste for the next 50 years and includes the following alternatives:

These alternatives are listed in order of the SWAC ranking, however, the planned implementation schedule for each alternative is based on the waste management needs of the County.

4.3 - Implementation Plan

4.3.1 - OVERVIEW
The implementation plan is divided into three different periods, short term, which consists of years 1 through 10, mid term, which consists of years 11 through 20, and long term, which consists of years 21 through 50. The short-term period has been further divided to consider the first half of the period (years 1 through 5) and the second half of the short-term period (years 6 through 10). It should be noted that most of the alternatives will be implemented in the short-term period. An implementation schedule for this scenario, for each of the categories, is presented in Appendix W.

4.3.2 - SOURCE REDUCTION
Source reduction includes those activities that will reduce the volume of waste that is entering the waste stream. Scenario 2 includes six alternatives that, when implemented, will achieve some percentage of source reduction. All of the alternatives that will allow the County to achieve source reduction can be implemented during the first half of the short-term period and include:

- Adopting an ordinance that would ban the use of plastic bags;
- Adopting an ordinance or regulation that would support packaging for product stewardship (i.e., regulation of excessive and non reusable / recyclable packaging);
- Developing and implementing an education and outreach program that would encourage home composting of organic waste materials;
- Developing and implementing an education and outreach program that would encourage developing partnerships with local companies, community organizations, schools, etc. to create a lottery for used and surplus items (e.g. office supplies and equipment);
- Developing and implementing an education and outreach program that would encourage the development of food donation programs; and
- Adopting an ordinance that would support extended producer responsibility (EPR).

During the second half of the short-term implementation period, the County will continue with the source reduction alternatives, which will include the continuation of the education and outreach programs for encouraging home composting of organic waste materials, encouraging the development of partnerships with local companies, community organizations, schools, etc. to create a lottery for used and surplus items, and encouraging the development of food donation programs.

The County will continue with these source reduction programs throughout the remainder of the planning period, with a goal of reducing the volume of waste that enters the waste stream through source reduction.

A description of the implementation activities for the short-term, as well as an implementation schedule is included in Appendix W.

4.3.3 - RECYCLING AND REUSE
Recycling and reuse alternatives can be implemented by the by the County during the first half of the short-term period to achieve waste volume reduction. Programs that will reduce the volume of waste through recycling and reuse include:

- Developing and implementing an education and outreach campaign designed to increase the public's
awareness of recycling programs;
- Developing and implementing a recycling education initiative that would encourage recycling programs for the County’s public school system;
- Developing and implementing a beneficial use that will result in the recycling of the RRF ash;
- Developing and implementing an education and outreach program to expand the recyclables that are accepted in the curbside recycling program; and
- Developing and implementing an Environmentally Preferred Purchasing Program that would provide incentives to vendors for using recycled products.

During the second half of the short-term implementation period, the County will continue with the recycling and reuse alternatives, which will include the continuation of the education and outreach programs for encouraging the development of recycling programs for the County’s public school system, the recycling of the RRF ash, and education and outreach programs to facilitate expansion of the curbside recycling program. These programs will continue throughout the planning period. The program designed to increase the public’s awareness of recycling programs is only considered a one time event, implemented during year 1, as is the development of the Environmentally Preferred Purchasing Program.

4.3.4 - COLLECTION AND TRANSPORT – CURBSIDE WASTE AND RECYCLING COLLECTIONS

The waste recycling and collection programs that the County will implement to encourage reduction in waste disposal, reduce operation costs, and increase the volume of waste managed by the County, that can be implemented during the first half of the short-term implementation period include:

- Hiring additional enforcement staff to provide more residential enforcement of solid waste rules, such as proper set-out and collection of residential bulky waste;
- Instituting a variable rate system to charge residents for their waste by weight or volume, or the amount of service they use;
- Changing the frequency of garbage, bulky waste and/or recyclables collection to increase collection efficiency and reduce the operating costs;
- Charging a fee for bulky waste collection service to charge the residents for the amount of service they use; and
- Requiring County collection of waste from other County departments which would potentially allow the County to generate additional revenues.

During the second half of the short-term implementation period, the County will continue with the various curbside waste and recycling collection alternatives, which will include the continuation of the variable rate system and the collection of waste from other County departments.

The County will continue with these curbside waste and recycling collection alternatives, throughout the remainder of the planning period, continuing to charge the residents for the amount of service that they use and generating revenues.

A description of the implementation activities for the short-term, as well as an implementation schedule is included in Appendix W.

4.3.5 - COLLECTION AND TRANSPORT – TRANSFER STATIONS

The alternatives that will allow the County to improve efficiency, resulting in reductions in the operation and maintenance costs, at the transfer stations will include:

- Redesigning transfer stations to allow for more efficient operations (e.g., material separation, eliminate compactors, expand tipping floors, etc.); and
- Reducing the operating hours/days at the transfer stations.

Both of these alternatives can be completed during the first half of the short-term implementation period.

4.3.6 - COLLECTION AND TRANSPORT – TRASH AND RECYCLING CENTERS

The alternatives that will allow the County to improve efficiency at the TRCs will include:

- Siting additional home chemical waste facilities;
- Redesigning the TRCs to allow for more efficient operations (e.g., use of transfer trailers, compactors, material separation); and
- Reducing the operating hours/days at the TRCs.

All of these alternatives can be implemented during the first half of the short-term implementation period, with some additional implementation activities to be completed during the second half.

4.3.7 - ENERGY RECOVERY

The plan to manage solid waste in the County includes energy recovery alternatives, including redesigning the RRF to allow for more efficient operations (e.g. expanding the unders building, expanding the trash tipping floor, etc.) and construct a new mass burn WTE/EFW facility at an existing solid waste site or other site. Neither of these alternatives are scheduled to be implemented during the first ten years of the project. Once there is sufficient waste
volume in the System to support a new mass burn WTE / EFW facility, the County will initiate implementation activities. Implementation activities are scheduled to occur between years 24 and 36.

A description of the implementation activities for the energy recovery alternatives is included in Appendix U.

4.3.8 - LANDFILL
A method of disposal is included in the plan to manage solid waste in Miami-Dade County. The following alternatives will be implemented to conserve the County's disposal capacity. All of the alternatives can be implemented in the first half of the short-term implementation period, including:

- Recovering recyclable materials at an active landfill to reduce the amount of waste requiring disposal;
- Constructing a wind or solar panel farm at an existing/closed landfill;
- Mining of the active and closed County landfills to recover additional waste disposal capacity, soil, and recyclable materials;
- Adopting a policy against new landfill construction in Miami-Dade County;
- Maximizing the use of non-County owned disposal facilities to preserve existing county-owned landfill space (includes out-of-County waste transfer);
- Closing the North Dade Landfill;
- Constructing a bio-reactor landfill; and
- Expanding the South Dade, Old South Dade or 58th Street Main Landfills.

During the second half of the short-term implementation period, as well as throughout the entire planning period, the County will continue with the various landfilling alternatives, which will include the continuation of recovering recyclable materials at the active landfills, mining of the active and closed County landfills, and maximizing the use of non-county owned disposal facilities to preserve the County's landfills space.

4.3.9 - OTHER SYSTEM IMPACTS
In order to limit the financial impact of the recommended programs and facilities on the County's System, alternatives that will reduce costs and/or generate additional revenue may be implemented as alternatives to raising the household waste collection fee. It should be noted that increases in the annual household waste fee beyond those which were already contemplated in the financial model provided by PWWM, were not considered as part of the planning process. These alternatives, which can be implemented in the first half of the short-term implementation period, include the following:

- Bring heavy equipment maintenance in-house (PWWM staff) – this alternative would reduce operations and maintenance costs and result in estimated annual savings of approximately $978,000.
- Charge a unified fee for use of all County facilities – this alternative would eliminate differences in fees charged to disposal customers (i.e. transfer station users would pay less and landfill/RRF users would pay more). This alternative would be expected to be revenue neutral assuming that fees are adjusted appropriately.
- Encourage municipalities to renew their long-term agreements for use of the County's solid waste management system – this alternative would confirm existing waste commitments and would be expected to be revenue neutral assuming that all existing agreements are renewed.
- Charge a disposal impact fee – this alternative would create additional revenue to manage waste generated by new development within the County and result in estimated additional revenues of approximately $280,000 annually.
- Charge one disposal rate, as opposed to the current contract rate versus non-contract rates – this alternative would simplify invoicing for the PWWM by eliminating differences in disposal fee rates (i.e. contract customers will pay more and non-contract customers will pay less). This alternative would be expected to be revenue neutral assuming that rates are adjusted appropriately.
- Charge a partial or full disposal assessment on property tax – this alternative would provide the County with a continuous and predictable source of revenue for the development and maintenance of adequate solid waste management facilities. The amount of additional revenue generated by this alternative would vary greatly depending on the implementation methodology. However, for purposes of this Master Plan the HDR Team assumed that all residential and commercial units within the County would pay an average annual assessment of $50. Based on these assumptions, the alternative would be expected to result in estimated additional revenues of approximately $37,000,000 annually.
- Institute economic, contractual and/or regulatory waste flow control – this alternative would allow the County to assure the financial viability of waste management facilities by providing a reliable, long-term supply of waste. The amount of additional revenue generated by this alternative would vary greatly depending on the implementation methodology.

The extent to which adjustments in the household waste fee will be necessary to fully fund the System will depend on which of the recommended revenue/savings alternatives are actually implemented and the timing of their implementation.
4.4 - Monitoring Plan
The volume of waste expected to be generated during the planning period was projected using industry accepted methods and historical trends. Applying these trends, and considering the various available alternatives, the planning team developed scenarios that would provide the required waste management capacity and are financially feasible. The SWAC received information on each of the scenarios, and reached a consensus, selecting the Environmentally Preferred Scenario to manage the County’s waste. A guide for implementing these alternatives was presented in the previous section.

The guide for managing the waste includes the implementation of new programs and facilities, some of which are only required as the volume of waste increases. To confirm that these programs and facilities are implemented as needed, it is recommended that the County undertake a monitoring program to update the plan status. The monitoring should be performed on a regular basis, no less frequent than annually. The monitoring will allow the County to confirm that programs and facilities are needed as proposed or, possibly sooner or later than projected. This monitoring program will provide the County with the information necessary to continue management of the waste in the County.